ARC Starflite I

ARC TYPE

B-19A

RMI Converter

Aircraft Radio Corporation
BOONTON, NEW JERSEY

ARC TYPE

B-19A

RMI Converter

Aircraft Radio Corporation
BOONTON, NEW JERSEY

ARC Starflite I

7010109
ARCIB-B19A-1
July 1961
Printed in U.S.A.

WARRANTY

Aircraft Radio Corporation (ARC) warrants each item of new equipment manufactured by it to be free from defects in material and workmanship under normal service use for which intended. ARC obligates itself under this warranty to replace or repair (at ARC discretion), at its factory, any ARC equipment, or major unit thereof (excluding vacuum tubes and transistors), which shall within one year after delivery to the original purchaser thereof be returned, transportation charges prepaid, to ARC with a statement from an authorized ARC Distributor or Dealer establishing the date of such delivery, which ARC examination shall disclose to have been defective in manufacture. This warranty shall not apply to any equipment, or major unit thereof, which, in the judgment of ARC, has been repaired or altered in any way so as adversely to affect its performance or reliability, or which has been subject to misuse, negligence or accident. This warranty is in lieu of all other guaranties or warranties express or implied. The obligation and responsibility of ARC for or with respect to defective equipment shall be limited to that expressly provided herein and ARC shall not be liable for consequential or other damage or expense whatsoever therefor or by reason thereof. ARC reserves the right to make changes in design or additions to or improvements in its equipment without obligation to install such additions or improvements in equipment theretofore manufactured.

Prepared by Technical Publications Department • Aircraft Radio Corporation • Boonton • New Jersey

The information in this instruction book does not profess to include all the details of design, production, or variations of the equipment, or to cover all the possible contingencies which may arise during operation, installation, or maintenance. Should special problems arise or further information be desired, contact the Technical Services Department of Aircraft Radio Corporation.

RC

IN-10 or 15463 Course Selecto

1 — 14050 } Plugs
1 — 14321 } E-14 Rack
1 — 15912 }
1 — 22629 B-19 Male Jumper plug.

1 - Control head for 156 System
ARC or GABBES

333 B-1 Servo-amp
Collins 331 A-1 or Equivilent
WITH RS 931 choke
IN A LEAD FOR HDG
EZ AND ORZ system

REMOVED

SAT	Toll	Mon		~~84~~
SUN	35 75	350		17.00 M
MON	35 75	100		40.00 CAR
TUE	35	100		27.00 Pam
WED		200		3.50 Toll
		400		87.50

91-248-8

1700.00
87.50
92500

ESTED BY _____ APPROVED BY _____

_____ DATE _____

. HEAD _____ ORDER NO. _____

ENTS

CONTENTS

Paragraph *Page*

SECTION I—GENERAL INFORMATION

1–1. INTRODUCTION 1
1–2. PURPOSE 1
1–3. SPECIFICATIONS 1
1–4. UNITS AND ACCESSORIES 1
1–5. ASSOCIATED EQUIPMENT 1
1–6. DESCRIPTION 2
B-19A Converter—Mounting—IN-16A Radio Magnetic Indicator

SECTION II—INSTALLATION

2–1. UNPACKING 3
2–2. CABLE FABRICATION 3
2–3. PREINSTALLATION TEST 3
2–4. INSTALLATION REQUIREMENTS 3
2–5. INSTALLATION OF B-19A AND M-41A MOUNTING 3
2–6. INSTALLATION OF IN-16A RMI 4
2–7. MODIFICATION OF RACK 4
2–8. INSTALLATION OF J-17A JUNCTION BOX 4
2–9. INITIAL ADJUSTMENTS AND TESTS 4
General—Test Procedure

SECTION III—OPERATION

3–1. GENERAL 25
3–2. RADIO MAGNETIC INDICATOR (RMI) 25
3–3. OPERATIONAL INDICATIONS 25

SECTION IV—PRINCIPLES OF OPERATION

4–1. INTRODUCTION 27
4–2. FUNCTIONAL DESCRIPTION 27
4–3. MODULATOR A1 28
4–4. BEARING SERVO AMPLIFIER A2 29
4–5. HEADING SERVO AMPLIFIER A3 30
4–6. HEADING FREQUENCY CONVERTER A4 30
4–7. INVERTER A5 33

CONTENTS—Continued

Paragraph *Page*

SECTION V—MAINTENANCE

5–1. INTRODUCTION 34
5–2. TEST EQUIPMENT 34
5–3. LUBRICATION 34
5–4. REMOVAL OF ASSEMBLIES 34
Removal of Assemblies A1 through A5—Removal of Gearing Assembly A6
5–5. DISASSEMBLY OF GEARING ASSEMBLY A6 35
Removal of Motor Generator A6MG1—Removal of 400-cps Differential Synchro A6B1—Removal of Resolver A6B2—Removal of Resolver A6B3
5–6. PERFORMANCE TEST AND ADJUSTMENT PROCEDURES 39
5–7. TROUBLE ANALYSIS 43
General—Trouble-shooting Chart
5–8. VOLTAGE AND RESISTANCE MEASUREMENTS 44

SECTION VI—DIAGRAMS

ILLUSTRATIONS

Figure	Title	Page
	SECTION I—GENERAL INFORMATION	
1–1.	ARC Type B-19A RMI Converter with ARC Type M-41A Mounting	*Frontispiece*
	SECTION II—INSTALLATION	
2–1.	B-19A RMI Converter with M-41A Mounting, Installation Dimensions	5
2–2.	Connector Kit ARC-22444, Exploded View	5
2–3.	IN-16A Radio Magnetic Indicator, Installation Dimensions	6
2–4.	J-17A Junction Box, Installation Dimensions	6
2–5.	B-19A RMI Converter and J-17A Junction Box, Interconnection Diagram	7/8
2–6.	B-19A RMI Converter and Type 15F VHF Navigation Equipment, Interconnection Diagram	9/10
2–7.	B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Unslaved Stabilized Heading Source, Interconnection Diagram	11/12
2–8.	B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-3 Course Director, Interconnection Diagram	13/14
2–9.	B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-4 Course Director, Interconnection Diagram	15/16
2–10.	Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-3 Course Director, Interconnection Diagram	17/18
2–11.	Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-4 Course Director, Interconnection Diagram	19/20
2–12.	Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, IN-16A RMI Indicators, and Type 21A ADF's with Type CD-3 Course Director, Interconnection Diagram	21/22
2–13.	Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, and IN-16A RMI Indicators with Type 21A ADF and Type CD-1 or CD-4 Course Director, Interconnection Diagram	23/24
	SECTION III—OPERATION	
3–1.	IN-16A Radio Magnetic Indicator	25
3–2.	Typical RMI Indications	25
	SECTION IV—PRINCIPLES OF OPERATION	
4–1.	B-19A RMI Converter and Associated Equipment, Block Diagram	26
4–2.	Modulator Assembly A1, Block Diagram	29
4–3.	Bearing Servo Amplifier A2, Block Diagram	31

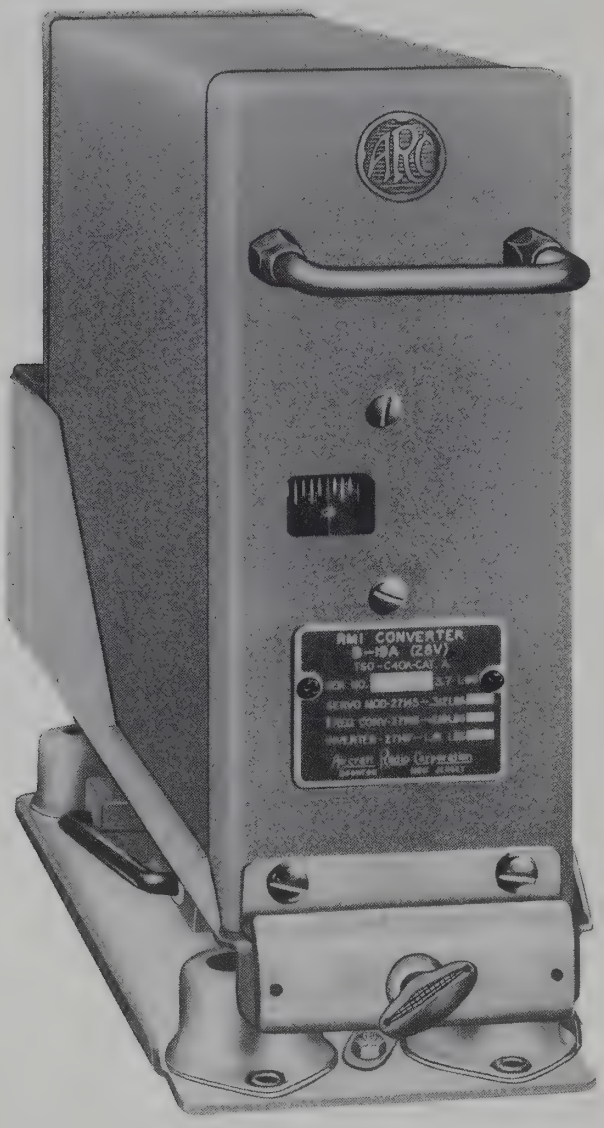
ILLUSTRATIONS—Continued

Figure	Title	Page
	SECTION IV—PRINCIPLES OF OPERATION—Continued	
4–4.	Heading Servo Amplifier A3, Block Diagram	31
4–5.	Heading Frequency Converter A4, Block Diagram	32
4–6.	Inverter A5, Block Diagram	32
	SECTION V—MAINTENANCE	
5–1.	Cable Assembly ARC-28145, Schematic Diagram	34
5–2.	B-19A RMI Converter, Assembly Locations and Adjustment Points	36
5–3.	Gearing Assembly A6, Exploded View	37/38
5–4.	Bench Test Interconnection Diagram for B-19A Converter	41/42
	SECTION VI—DIAGRAMS	
6–1.	B-19A RMI Converter, Schematic Diagram	49/50
6–2.	Main Assembly A7, Wiring Diagram	51/52
6–3.	Modulator A1, Wiring Diagram	53
6–4.	Bearing Servo Amplifier A2, Wiring Diagram	53
6–5.	Heading Servo Amplifier A3, Wiring Diagram	54
6–6.	Heading Frequency Converter A4, Wiring Diagram	54
6–7.	Inverter A5, Wiring Diagram	55
6–8.	Gearing Assembly A6, Wiring Diagram	56
6–9.	IN-16A Radio Magnetic Indicator, Schematic Diagram	57
6–10.	J-17A Junction Box, Schematic Diagram	58

TABLES

Table	Title	Page
1–1.	Units and Accessories	1
1–2.	Associated Equipment	1
5–1.	Test Equipment	35
5–2.	Test and Adjustment Procedure	39
5–3.	Trouble-shooting Chart	43
5–4.	Voltage Measurements	44
5–5.	Resistance Measurements for Gearing Unit Assembly A6	46

ARC TYPE B-19A
RMI Converter



TP1526

Figure 1–1. ARC Type B-19A RMI Converter with ARC Type M-41A Mounting

SECTION I
GENERAL INFORMATION

1–1. INTRODUCTION.

This instruction book contains installation, operation, principles of operation, and maintenance information for the ARC Type B-19A RMI Converter.

1–2. PURPOSE.

The ARC Type B-19A RMI Converter, shown in Figure 1–1, is designed for operation with an ARC Type 15C, 15D, 15E, or 15F VHF Navigation Equipment and either a 400-cps stabilized heading source, as used in the ARC Type CD-3 Course Director, or a 1350-cps stabilized heading source, as used in the ARC Type CD-1 and CD-4 Course Directors. When used as part of the CD-1, CD-3, or CD-4, the stabilized heading source is operated as a slaved unit; when used alone, the stabilized heading source is operated as an unslaved or "free-running" unit.

The B-19A combines omnirange information from the vhf navigation equipment with magnetic heading information from the stabilized heading source to provide continuous aircraft-to-omnirange bearing information. The B-19A also provides driving power for the heading card synchro of a "bootstrap"-type radio magnetic indicator (RMI) such as the ARC Type IN-16A.

1–3. SPECIFICATIONS.

Power Requirements:	1.1 amperes at 27.5 volts dc, with heading frequency converter A4 and inverter A5 installed
	0.5 ampere at 27.5 volts dc and 0.94 volt-amperes at 26 volts, 400 cps, without heading frequency converter A4 and inverter A5, but with external 400-cps power supply
Mounting:	ARC Series 40 Mounting (refer to paragraph 1–6)
Weight:	5.7 pounds with all assemblies
	5.5 pounds, without heading frequency converter A4
	4.1 pounds, without heading frequency converter A4 and inverter A5
Dimensions:	6 inches high, 2½ inches wide, 12¾ inches deep
Certification:	FAA TSO C-36a and C-40a, Category A.

1–4. UNITS AND ACCESSORIES.

The units and accessories which may be used in a B-19A installation are listed in Table 1–1.

TABLE 1–1. UNITS AND ACCESSORIES

Qty	Name	ARC Part No.
1	RMI Converter, ARC Type B-19A	25930
1	Modulator Assembly A1	25583
1	Bearing Servo Amplifier Assembly A2	25590
1	Heading Servo Amplifier Assembly A3	27145
1	Heading Frequency Converter Assembly A4[1]	27146
1	Inverter Assembly A5[1]	27147
1	Gearing Assembly A6	26996
1	Mounting, ARC Type M-41A[2]	21790
1	RMI Indicator, ARC Type IN-16A	27226
1	Connector Kit, consisting of:	22444
1	Connector	22630
1	Plate	22675
6	Sems, fillister head, No. 4-40, ¼ inch inch long, split lockwasher	524-0016
2	Screw, machine, flat head, No. 6-32, 5/16 inch long	146-0020
2	Stud, snapslide	22237
1	Information Plate	28269

[1] Use depends on frequency of heading source and available power supply. Refer to paragraph 1–6.
[2] For single-unit installation. For multiple-unit mountings, refer to instruction book for ARC Series 40 Mountings.

1–5. ASSOCIATED EQUIPMENT.

Table 1–2 lists the associated units which may be required for operation of the B-19A. In addition to the units listed, a cable assembly must be fabricated from individual wires (not supplied) and the connector in Connector Kit ARC-22443. The recommended wire sizes are shown in Figures 2–5 through 2–13. The length of the cable will depend on the location of the equipment in the aircraft.

TABLE 1–2. ASSOCIATED EQUIPMENT

Qty	Name	ARC Type No.	ARC Part No.
1	Junction Box[1]	J-17A	28275
1	Connector[1]	—	14050
1	Connector[1]	—	12332
1	Connector[1]	—	15912
1	Dynaverter	DV-20A	25900
1	Gyro Indicator	G-13A[2]	24790
1	Slaved Gyro	G-12[2]	20753
1	Slaved Gyro	G-14A[2]	24761
1	VHF Navigation Equipment	15C, 15D, 15E, or 15F	—

[1] See Figure 2–5. Required only if B-19A is added to existing installation of Type 15( ) equipment using a Type E-14, E-14A-1, or E-17 Rack.
[2] Only one gyro is used as the stabilized heading source. G-12 is part of Type CD-1 Course Director, G-13A part of Type CD-3, and G-14A part of Type CD-4.

1–6. DESCRIPTION.

B-19A Converter. The ARC Type B-19A RMI Converter is a transistorized, navigation device that combines omnirange information with aircraft heading information to provide a pilot with continuous indications of the magnetic bearing of his aircraft with respect to a VOR station. The B-19A also amplifies aircraft heading signals to the level required to operate one or more RMI heading cards.

Plug-in, modular assembly construction is used to facilitate the use of the B-19A with different stabilized heading sources. Main assembly A7, enclosed by an aluminum dust cover, supports from four to six plug-in modular assemblies, depending on the frequency of the heading source and whether an external 400-cps power supply is used for the B-19A, the heading source, and the IN-16A RMI. The plug-in assemblies are identified as: Modulator A1, Bearing Servo Amplifier A2, Heading Servo Amplifier A3, Heading Frequency Converter A4, Inverter A5, and Gearing Assembly A6.

All plug-in assemblies are required if the B-19A is used with a 1350-cps slaved heading source in an aircraft that does not have a 400-cps power supply. If a 400-cps power supply is available, inverter A5 is not required.

Heading frequency converter A4 and inverter A5 are not used if a 400-cps slaved heading source is used with the B-19A, but an external 400-cps power supply such as the ARC Type DV-20A Dynaverter is required to furnish 400-cps power to the B-19A, IN-16A, and slaved heading source.

Heading frequency converter A4 is not used if the B-19A is used with an unslaved heading source. Inverter A5 is required to furnish 400-cps power to the B-19A, IN-16A, and unslaved heading source.

Mounting. The ARC Type M-41A Mounting is used to shock-mount the B-19A RMI Converter and to provide a means of making electrical connections to the unit in single-unit installations. The B-19A is secured by an adjustable flange located at the front of the mounting. Two flexible metal straps, located on the underside of the mounting, are used to ground the B-19A and M-41A to the airframe. Eight holes are provided in the bottom plate of the M-41A for securing the mounting to the airframe.

Note

If the B-19A is to be installed with other ARC modular-type units, one of the multiple-unit ARC Series 40 Mountings may be used. For detailed information, refer to the instruction book for the ARC Series 40 Mountings.

IN-16A Radio Magnetic Indicator. The IN-16A consists of a rotating heading card, heading index, double-bar pointer, and single-bar pointer. The heading card rotates as the aircraft turns so that the magnetic heading of the aircraft is under the heading index at the top of the indicator. One pointer (usually the double-bar pointer) indicates the magnetic bearing from the aircraft to the VOR station. The other pointer is used to indicate the magnetic bearing of a low-frequency station or a second VOR station in dual-VOR, single-RMI installations.

SECTION II
INSTALLATION

2–1. UNPACKING.

Remove all packing material from the packing case and carefully remove the equipment. Inspect the equipment for damage. Check the unit and its accessories against the packing slip to be sure all items have been received and removed from the packing case.

2–2. CABLE FABRICATION.

The cable assemblies used to interconnect the B-19A and its associated units should be fabricated from individual wires. The ARC-22630 connector required for the B-19A is supplied, but the individual wires and other connectors are not. An open-wire cable is recommended because of its flexibility, ease of construction, and facility of repair. The length of the cable assemblies will depend on the location of the units in the aircraft. System interconnection diagrams are shown in Figures 2–5 through 2–13.

2–3. PREINSTALLATION TEST.

The B-19A RMI Converter has been tested and adjusted at the factory; however, a bench test should be performed before installation to insure that the unit was not damaged during shipment. Refer to Table 5–2 for the bench test procedure.

2–4. INSTALLATION REQUIREMENTS.

The location and type of installation used for the B-19A will depend on the type of system in which the unit is used and the space available in the aircraft. To facilitate installation and maintenance, compare the installation area under consideration with the dimensions of the equipment, shown in Figures 2–1, 2–3, and 2–4; locate the unit and cable where they will be accessible for inspection and maintenance and in area that is free from excessive vibration and heat; allow sufficient clearance on all sides of the unit for sway, ventilation, and easy removal; do not run the interconnecting cable where it may be subjected to excessively high temperatures or where it may be inductively coupled to noise-generating equipment; if used with ARC Type 15( ) equipment, be sure to modify the rack, as described in paragraph 2–7.

2–5. INSTALLATION OF B-19A AND M-41A MOUNTING.

The B-19A may be installed separately on an ARC Type M-41A Mounting, as described in the following procedure, or with other ARC modular units on an ARC Series 40 multiple-unit mounting, as shown in the instruction book for the ARC Series 40 Mountings. To install the M-41A and the B-19A, proceed as follows:

Step 1. Use the bottom plate of the M-41A Mounting as a template to locate the mounting holes and drill the mounting surface as shown in Figure 2–1. The mounting surface should be clean, bare metal to insure proper grounding of the unit.

Step 2. Secure the M-41A Mounting with binding head screws, lockwashers, and nuts.

Step 3. Remove the coupling box from the rack and the top cover from the coupling box (see Figure 2–2).

Step 4. Attach Connector ARC-22630, in the LI2 position, to Plate ARC-22675, as shown in Figure 2–2.

Step 5. Cut the wires for the interconnecting cable assembly to the required lengths; use color-coded wires or tag both ends to simplify interconnection and future maintenance.

Step 6. Bare and tin the ends of the cut wires.

Step 7. Solder the wires to the contacts supplied with Connector Kit ARC-22444. Do not get solder on the outside of the contacts.

Note

Contacts for letter-designated holes are larger than the contacts intended for number-designated holes. If desired, the connector may be used as a holding fixture by inserting the contact part way before soldering.

Step 8. Loosen the coupling box cable clamp. Route the contacts and the attached wires through the cable clamp. Insert the contacts in the appropriate connector holes (see Figures 2–5 through 2–13). Be sure each contact is seated.

Note

To remove a contact from the connector, use Contact Removing Tools ARC-22001 and ARC-22002.

Step 9. Arrange the wires allowing enough slack to prevent tension of the connector contacts when the cable clamp is tightened.

Step 10. Attach two ARC-22237 snapslide studs on the coupling box as shown in Figure 2–2. Place the coupling box on the rear of the mounting. Secure the coupling box by engaging the two snapslide fasteners on the mounting with the snapslide studs on the coupling box.

Step 11. Loosen the thumbscrew on the front of the M-41A. Slide the B-19A onto the M-41A until their connectors are completely mated. Secure the B-19A by positioning the M-41A clamp and tightening the thumbscrew. Safety-wire the thumbscrew.

2–6. INSTALLATION OF IN-16A RMI.

The IN-16A RMI should be installed on a shock-absorbing instrument panel. Installation dimensions are shown in Figure 2–3. The instrument should be mounted from the rear of the panel using four No. 6-32 by ¾ inch binding head screws for attachment.

2–7. MODIFICATION OF RACK.

The rack used as part of the Type 15( ) VHF Navigation Equipment must be modified because of the additional load presented by the IN-16A RMI. Remove the rear cover of the rack and remove the wire and resistors specified, as applicable.

a. E-14 Rack: Remove the red wire between C301 and R301, and remove R301 and R302.

b. E-14A-1 Rack: Remove the red wire between C1702 and R1701, and remove R301 and R302.

c. E-16 Rack: Remove the red wire between C1702 and R1701, and remove R1701 and R1702.

d. E-16A-1 Rack: Remove the red wire between C1702 and R1701, and remove R1701 and R1702.

e. E-17 Rack: Remove the red wire between C401 and R401, and remove R401 and R402.

Replace the rear cover of the rack and attach the decal information plate ARC-28269 to the cover.

2–8. INSTALLATION OF J-17A JUNCTION BOX.

The J-17A Junction Box is required if a Type 15( ) equipment using a Type E-14, E-14A-1 or E-17 Rack is already in the aircraft in which the B-19A is installed. Figure 2–4 shows the installation dimensions for the J-17A, and Figure 2–5 shows the interconnections required. Proceed as follows:

Step 1. Select a suitable location for the junction box. If possible, the box should be mounted on the rear cover of the Type 15( ) rack, but in any case it should be located to permit connection of the rack cable assembly.

Step 2. Drill the mounting surface for four No. 6-32 binding head screws. Secure the junction box to the mounting surface.

Step 3. Disconnect connectors from J304 and J306 of the E-14 or E-14A-1 Rack, or J404 and J406 of the E-17 Rack, and reconnect to J1 and J3, respectively, of the junction box.

Step 4. Construct a new cable, and interconnect J2 of the junction box and the other units, as shown in Figure 2–5.

2–9. INITIAL ADJUSTMENTS AND TESTS.

General. If the B-19A was bench tested before it was installed, no post-installation adjustments will be required. The B-19A and all associated equipment should be tested after installation is completed, however, to insure proper interconnection of the B-19A and its associated equipment.

Test Procedure.

Step 1. Interconnect test equipment and B-19A as shown in Figure 5–4. Apply power to B-19A, VOR equipment, and stabilized heading source.

Step 2. Connect ATTEN output of H-14A Signal Generator through a Boonton Radio Type 505-B Attenuator to antenna connector on VOR receiver. Set H-14A OMNI TRACK switch to 0, MODULATION switch to OMNI, MC switch to position B (114.9 mc), and ATTENUATOR dial to 100 μv.

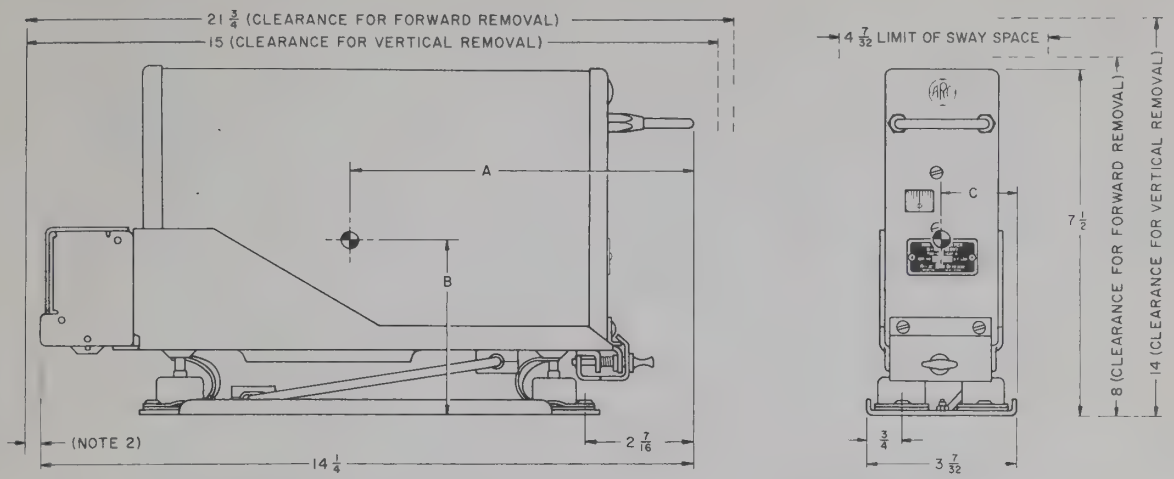
Step 3. Tune receiver to 114.9 mc and set course selector pointer of course indicator to 0. Vertical pointer of course indicator should be centered, flag should be out of sight, and to-from meter should indicate TO. Appropriate pointer of RMI should point to 0.

Step 4. Set course selector pointer of course indicator to 180. Vertical pointer of course indicator should be centered, flag should be out of sight, and to-from meter should indicate FROM. Appropriate pointer of RMI should point to 0.

Step 5. Set course selector pointer of course indicator to 10. Flag of course indicator should appear and vertical pointer should move five dots right of center. Appropriate pointer of RMI should point to 0.

Step 6. Advance H-14A OMNI TRACK switch in 60-degree increments through 360 degrees. Adjust course selector pointer of course indicator to selected track after each switch setting. Vertical pointer of course indicator should center after each setting and appropriate pointer of RMI should point to within ± 2 degrees of the selected track. RMI pointer should not "overshoot" more than once before coming to rest at each new position.

Step 7. Cage the stabilized heading source. Rotate the dial in 30-degree increments through 360 degrees. Check RMI heading card after each 30-degree change. The RMI heading card should not overshoot more than once before coming to rest at each new reading, and all readings should be within ± 2 degrees of the heading-source setting.



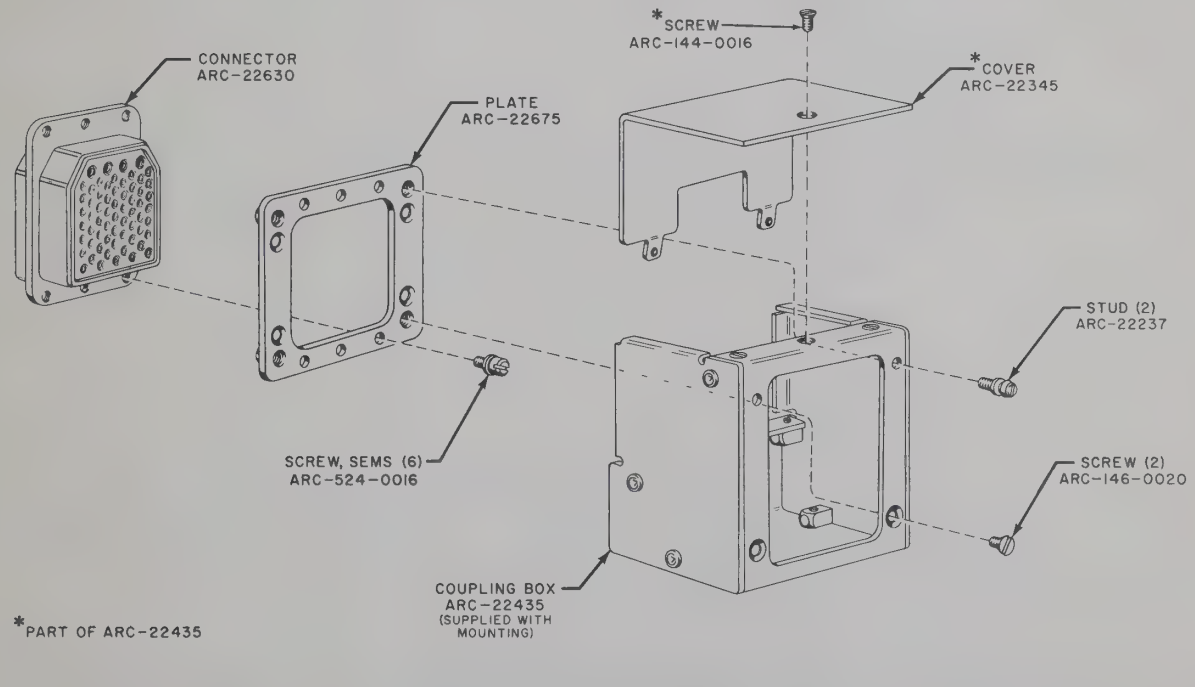
UNIT WEIGHTS AND CG (⊕) DIMENSIONS

EQUIPMENT INSTALLED	WEIGHT (LB)	CG DIMENSIONS		
		A	B	C
ASSEMBLIES A1 THROUGH A6	5.7	7 1/8	3 7/8	1 1/2
ASSEMBLIES A1, A2, A3, A5, AND A6	5.5	7 1/4	3 7/8	1 1/2
ASSEMBLIES A1, A2, A3, AND A6	4.1	6 1/2	3 5/8	1 1/2

NOTES:
1. DIMENSIONS ARE IN INCHES.
2. ALLOW 2 INCHES FOR CABLE BEND.
3. WEIGHT: B-19A, SEE TABLE; M-41A, 1.4 LB

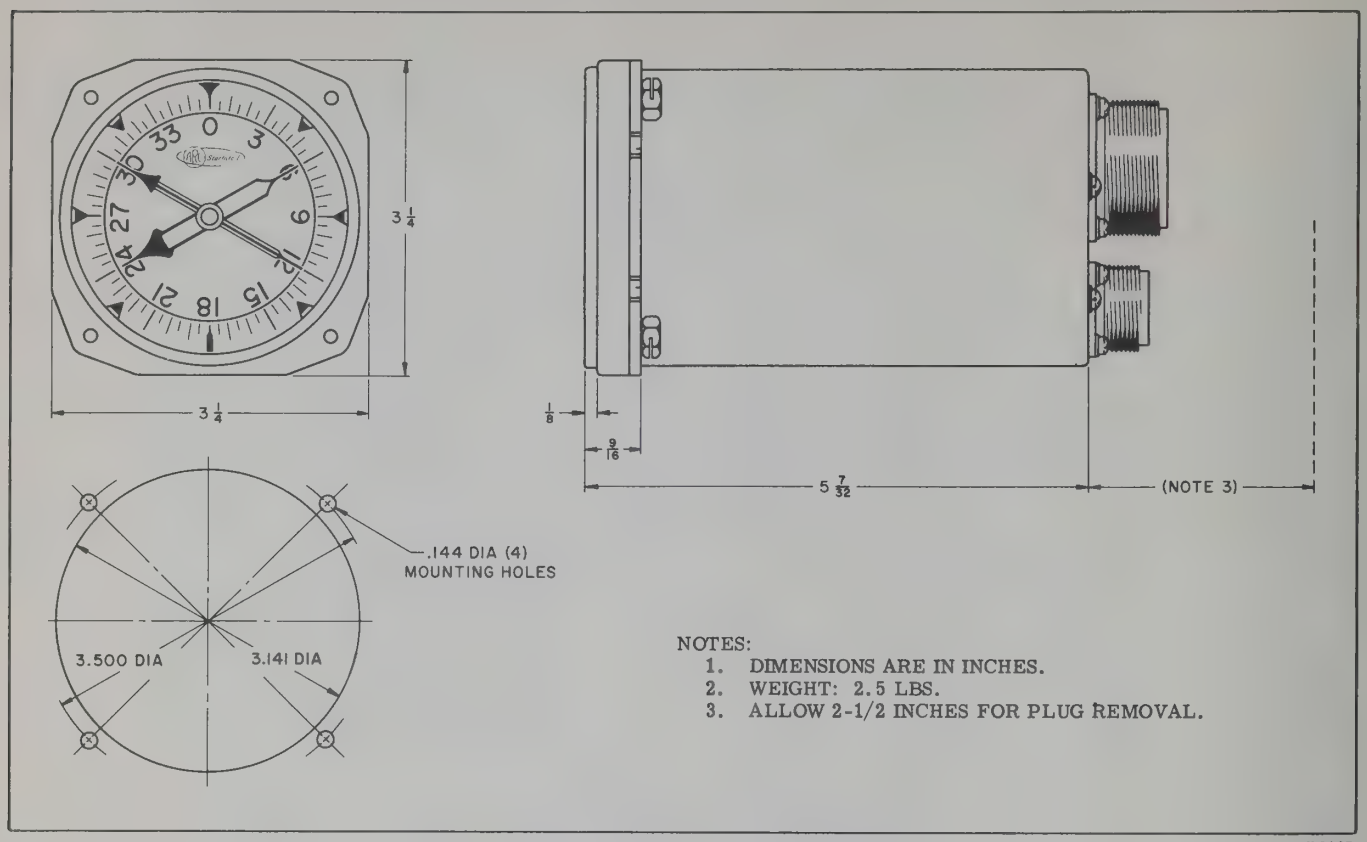
TP3193

Figure 2–1. B-19A RMI Converter with M-41A Mounting, Installation Dimensions



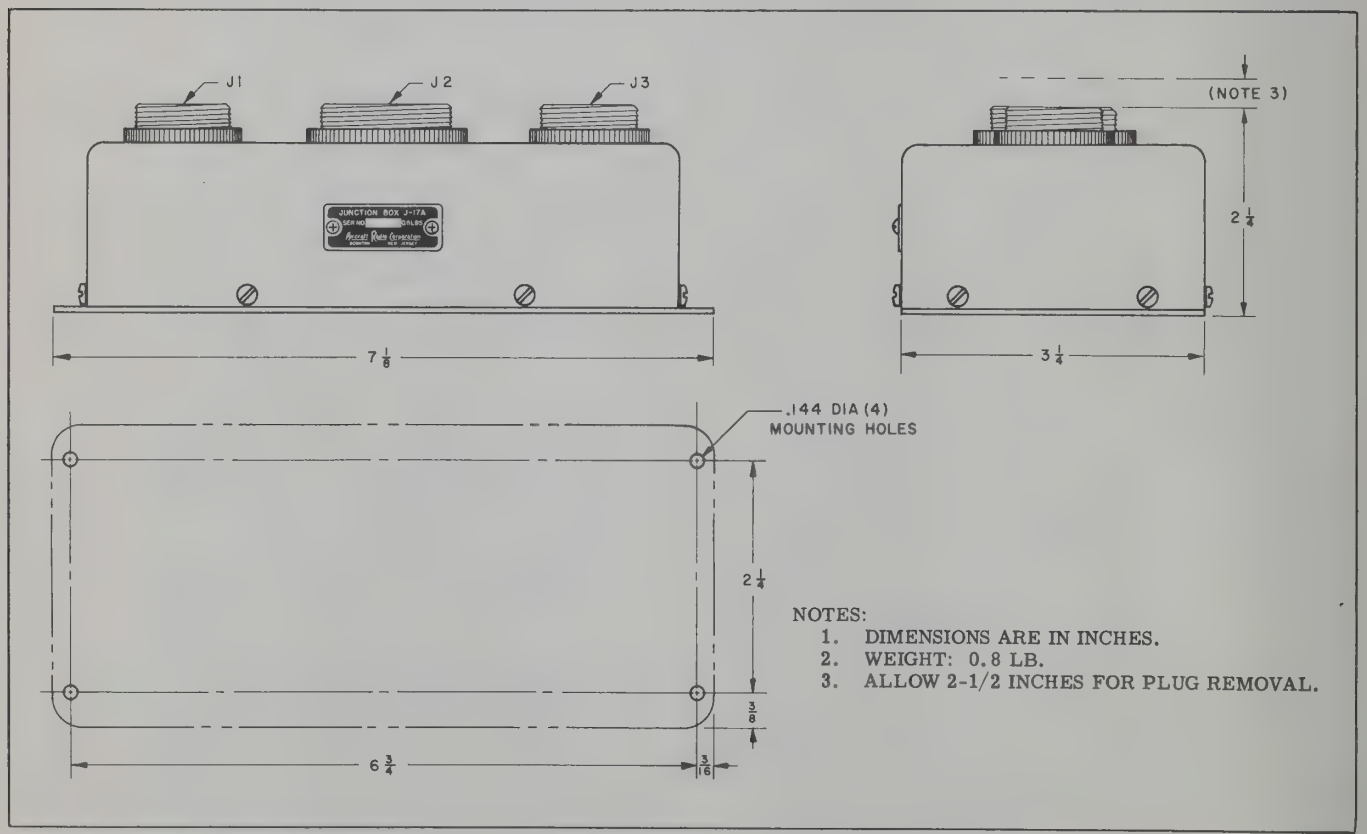
TP3195

Figure 2–2. Connector Kit ARC-22444, Exploded View



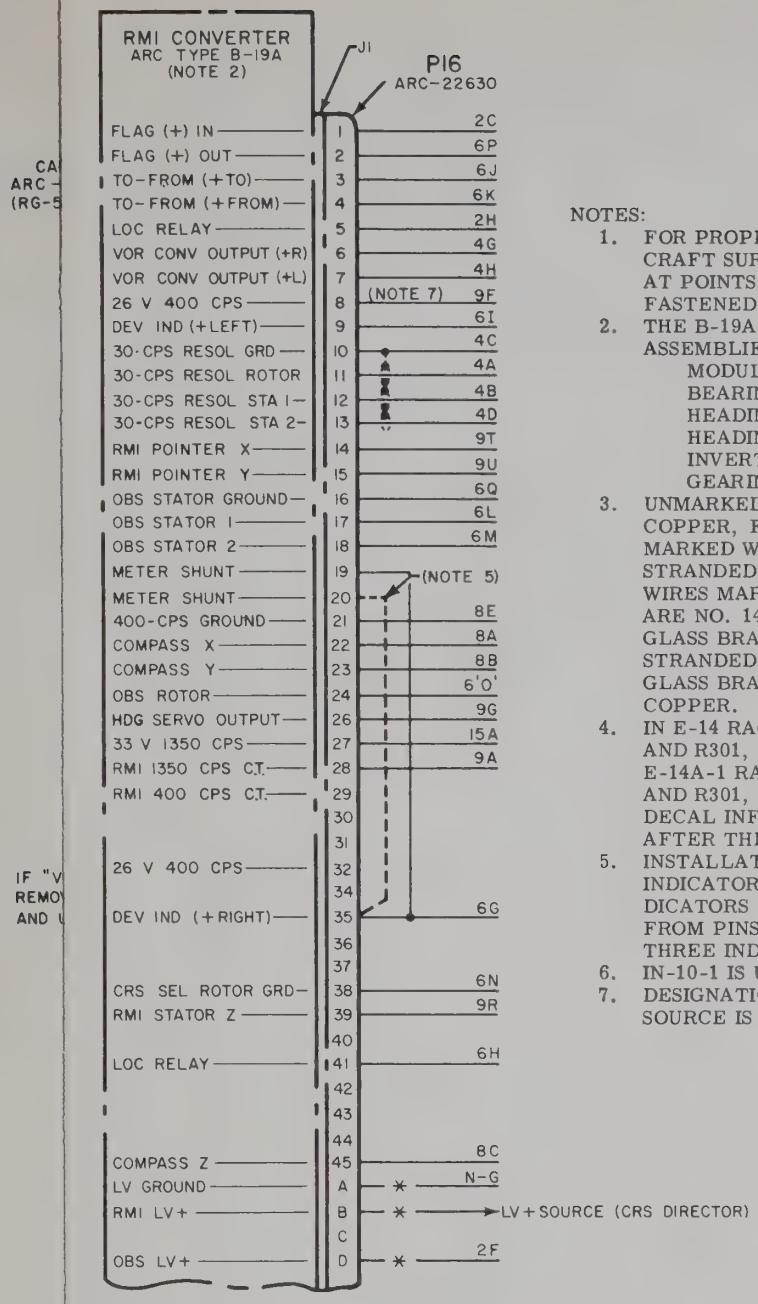
TP3197

Figure 2–3. IN-16A Radio Magnetic Indicator, Installation Dimensions



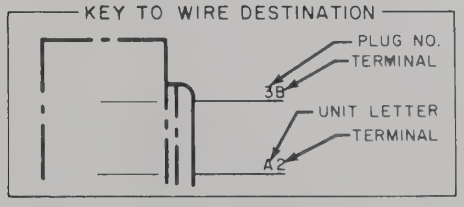
TP3199

Figure 2–4. J-17A Junction Box, Installation Dimensions



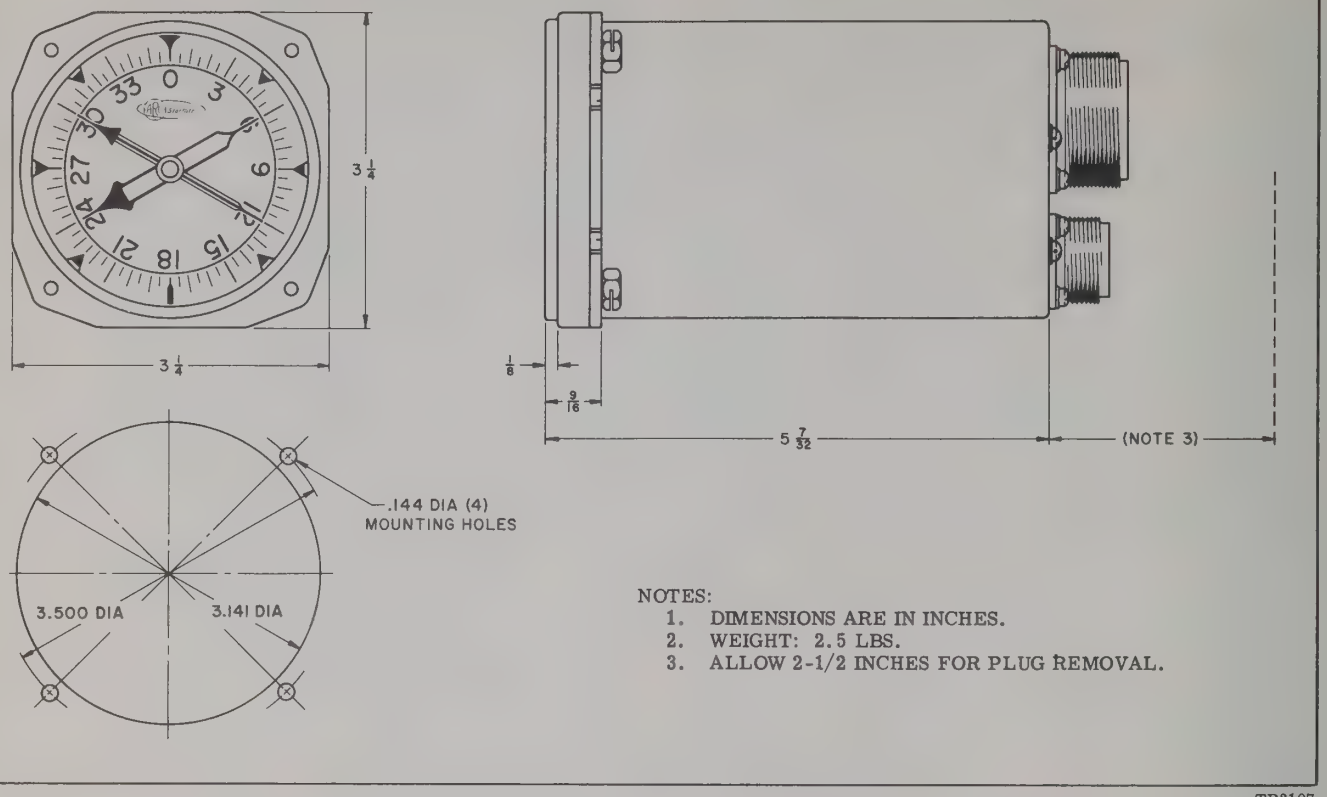
NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   - MODULATOR A1
   - BEARING SERVO AMPLIFIER A2
   - HEADING SERVO AMPLIFIER A3
   - HEADING FREQUENCY CONVERTER A4
   - INVERTER A5
   - GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. IN-10-1 IS USED IN UNSLAVED SYSTEMS.
7. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.



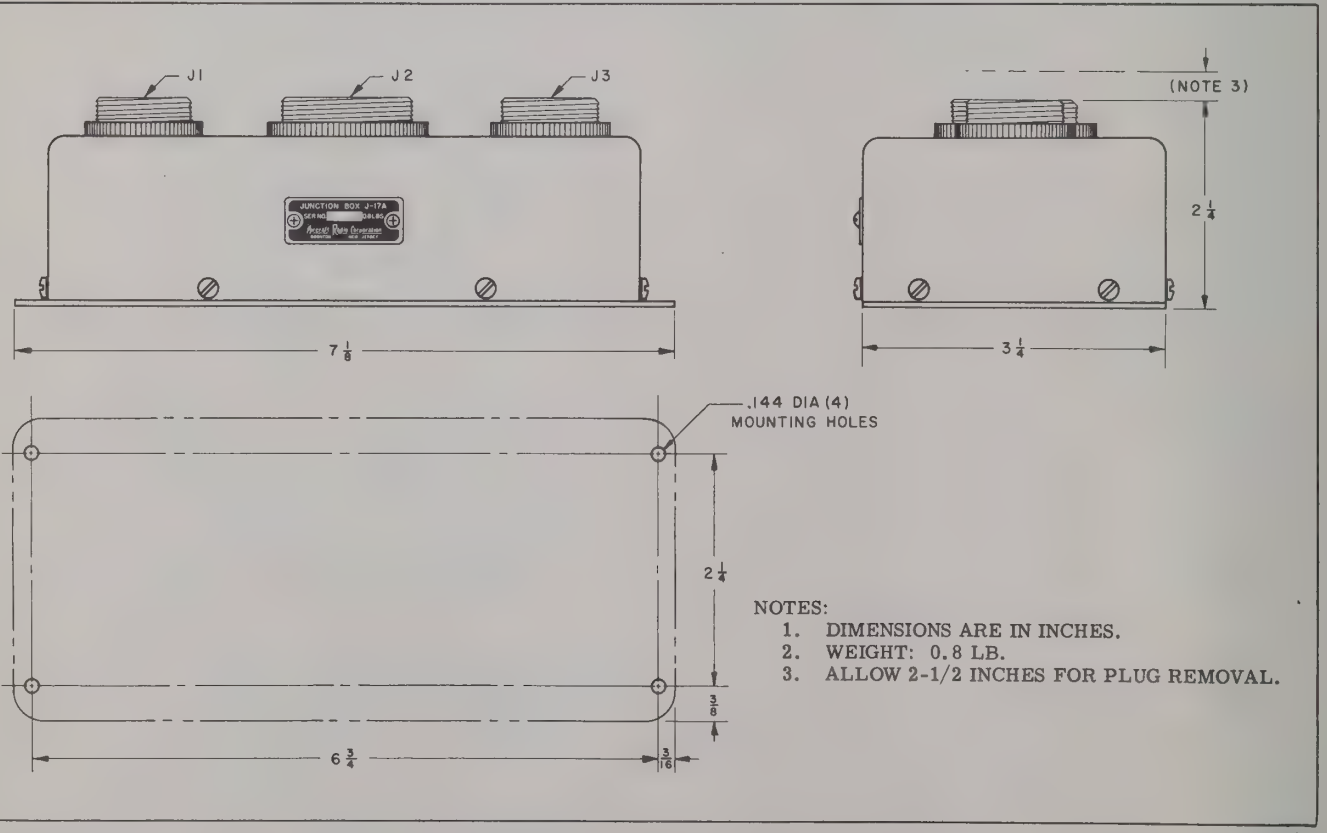
27270B(TP)

Figure 2–5. B-19A RMI Converter and J-17A Junction Box, Interconnection Diagram



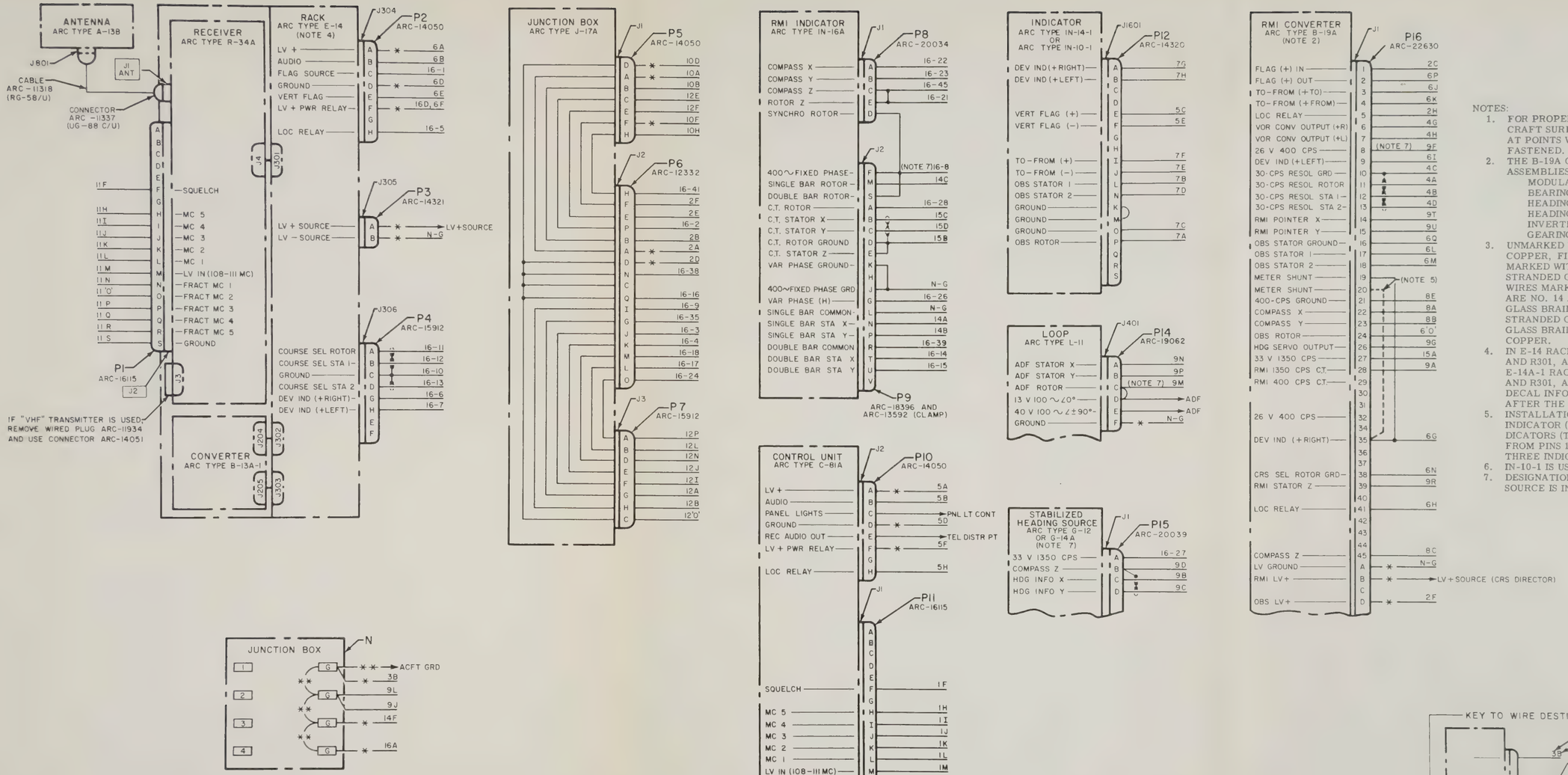
TP3197

Figure 2–3. IN-16A Radio Magnetic Indicator, Installation Dimensions



TP3199

Figure 2–4. J-17A Junction Box, Installation Dimensions



NOTES:

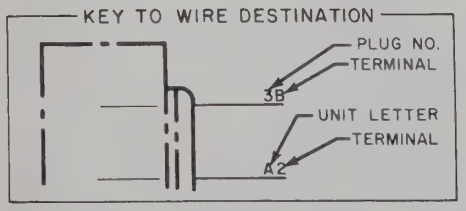
1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   - MODULATOR A1
   - BEARING SERVO AMPLIFIER A2
   - HEADING SERVO AMPLIFIER A3
   - HEADING FREQUENCY CONVERTER A4
   - INVERTER A5
   - GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. IN-10-1 IS USED IN UNSLAVED SYSTEMS.
7. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.

Figure 2-5. B-19A RMI Converter and J-17A Junction Box, Interconnection Diagram

630
2C
12E
12I
12J
2H
4G
4H
9F
12B
4C
4A
4B
4D
9T
9U
12K
12L
12N
E 5)
8E
8A
8B
12P
9G
15A
9A
12A
12'0'
9R
10H
8C
N-G
→LV + SOURCE (CRS DIRECTOR)
N2

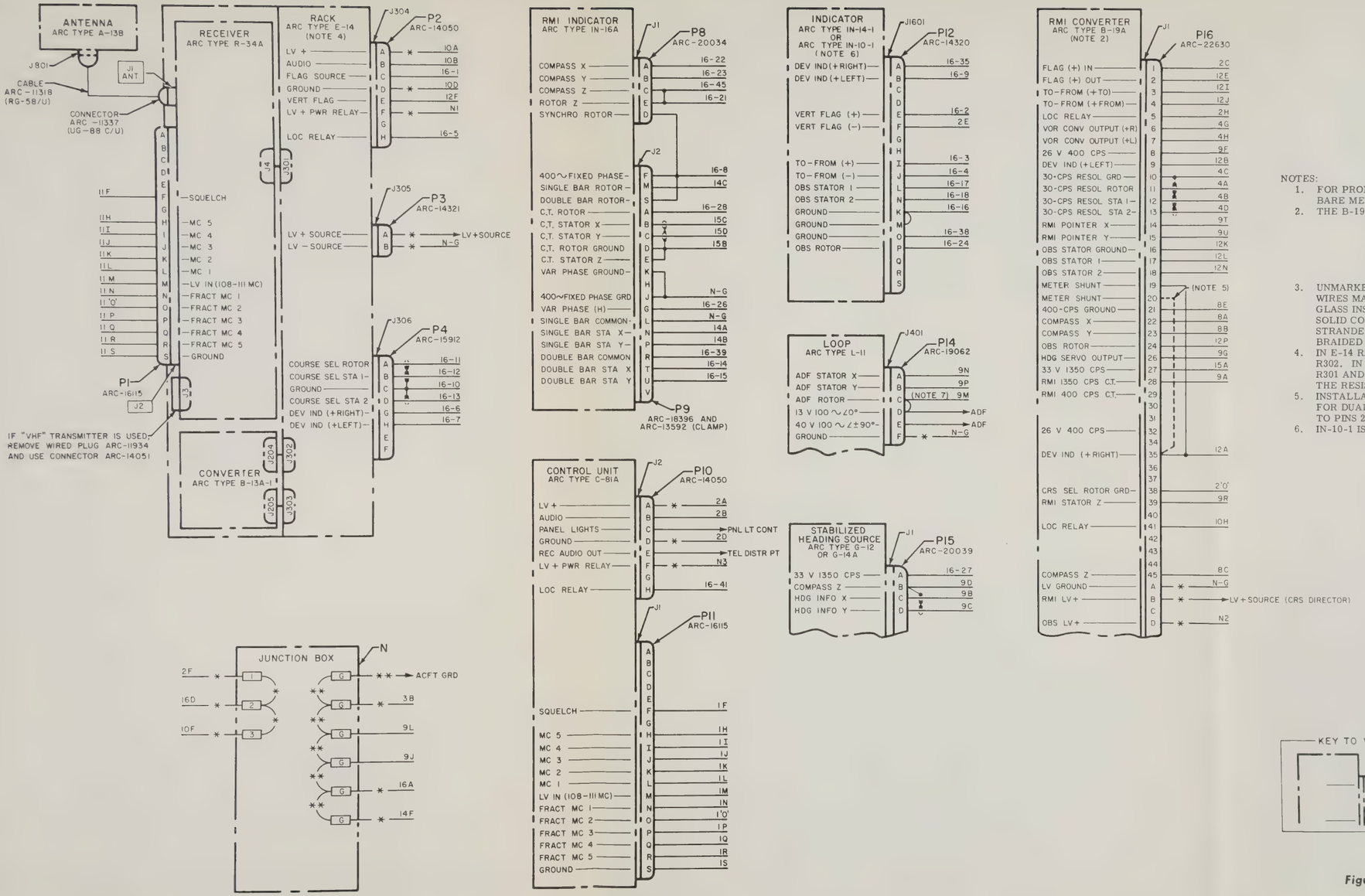
NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   HEADING FREQUENCY CONVERTER A4
   INVERTER A5
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. IN-10-1 IS USED IN UNSLAVED SYSTEMS.



27954B(TP)

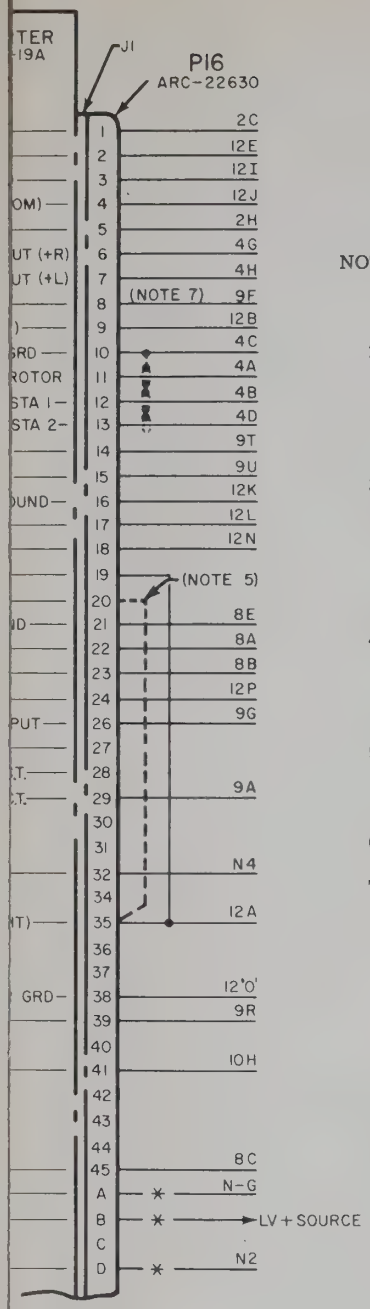
Figure 2–6. B-19A RMI Converter and Type 15F Navigation Equipment, Interconnection Diagram



NOTES:

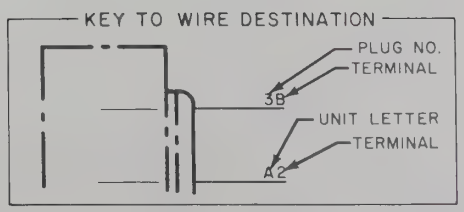
1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   - MODULATOR A1
   - BEARING SERVO AMPLIFIER A2
   - HEADING SERVO AMPLIFIER A3
   - HEADING FREQUENCY CONVERTER A4
   - INVERTER A5
   - GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. IN-10-1 IS USED IN UNSLAVED SYSTEMS.

Figure 2-6. B-19A RMI Converter and Type 15F Navigation Equipment, Interconnection Diagram



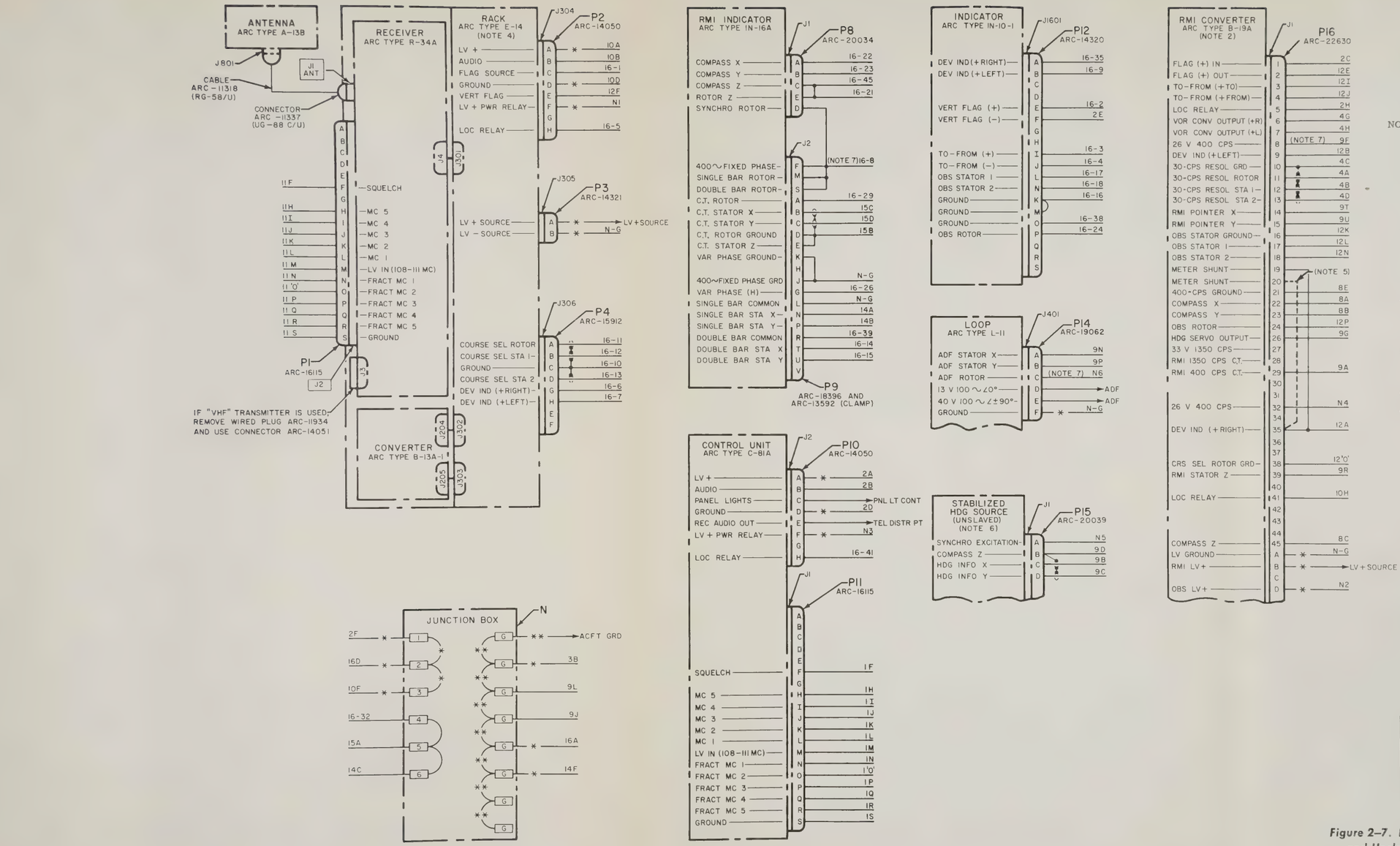
NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   INVERTER A5
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
7. IF THE B-19A DOES NOT CONTAIN INVERTER ASSEMBLY A5, 26-VOLT 400-CPS POWER FOR THE B-19A, RMI, MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.



27958B(TP)

Figure 2–7. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Unslaved Stabilized Heading Source, Interconnection Diagram

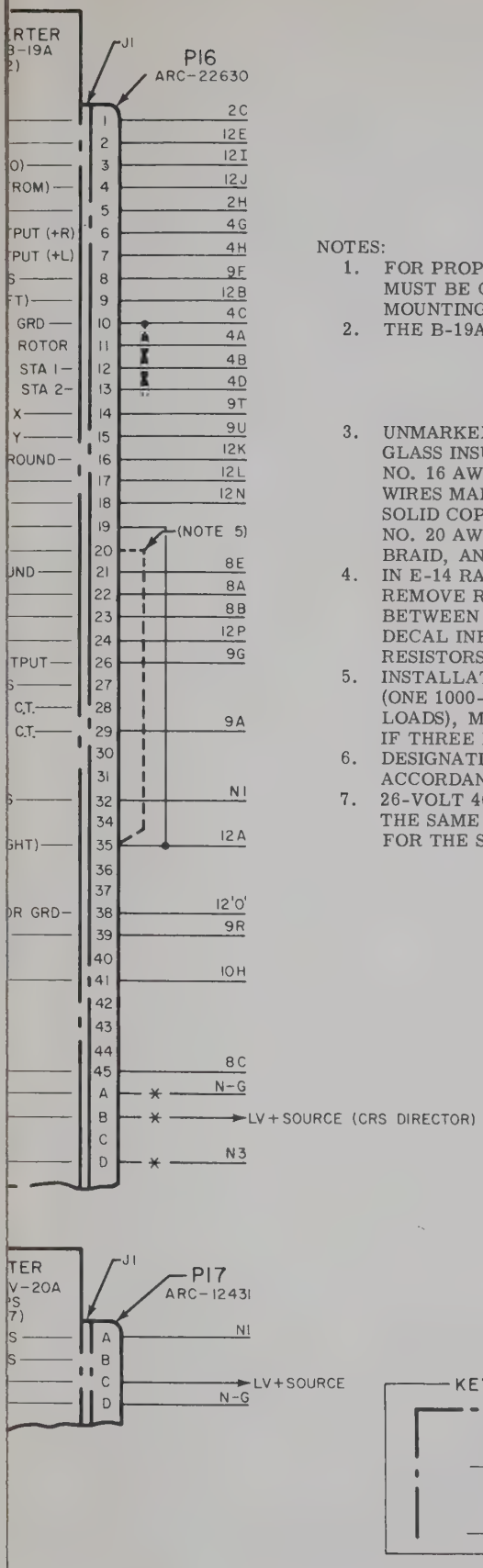


NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   INVERTER A5
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
7. IF THE B-19A DOES NOT CONTAIN INVERTER ASSEMBLY A5, 26-VOLT 400-CPS POWER FOR THE B-19A, RMI, MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.

27958B(TP)

Figure 2-7. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Unslaved Stabilized Heading Source, Interconnection Diagram

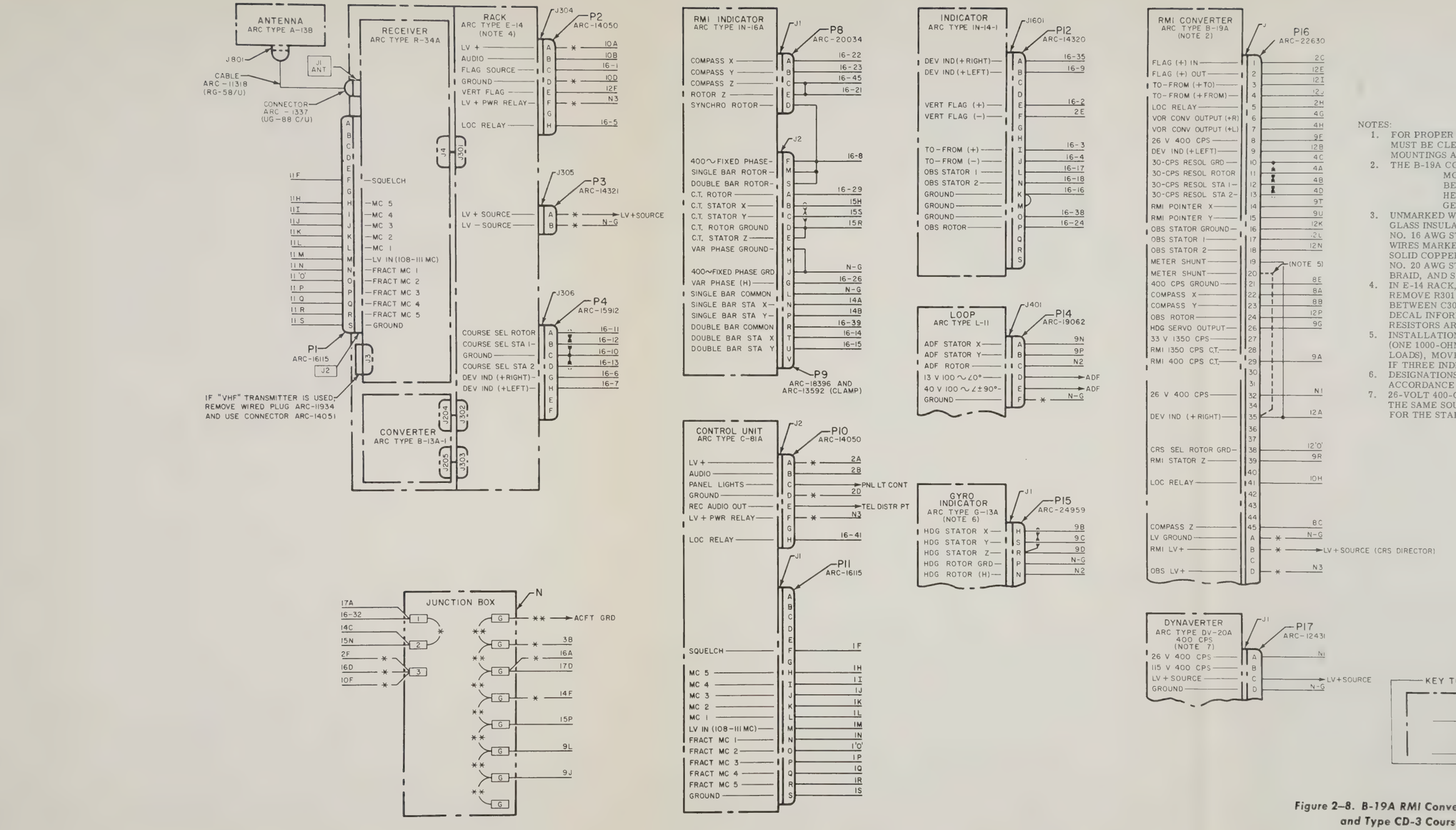


NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
7. 26-VOLT 400-CPS POWER FOR THE B-19A, RMI, MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.

27953A(TP)

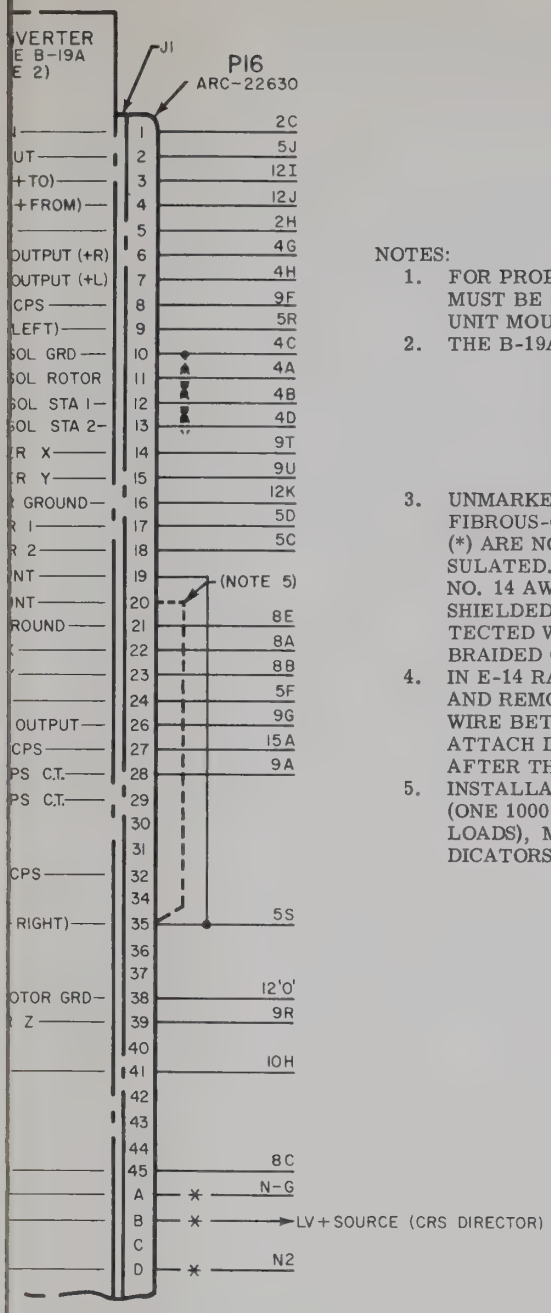
Figure 2–8. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-3 Course Director, Interconnection Diagram



NOTES:

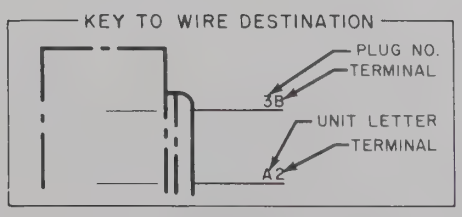
1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
7. 26-VOLT 400-CPS POWER FOR THE B-19A, RMI, MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.

Figure 2-8. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-3 Course Director, Interconnection Diagram



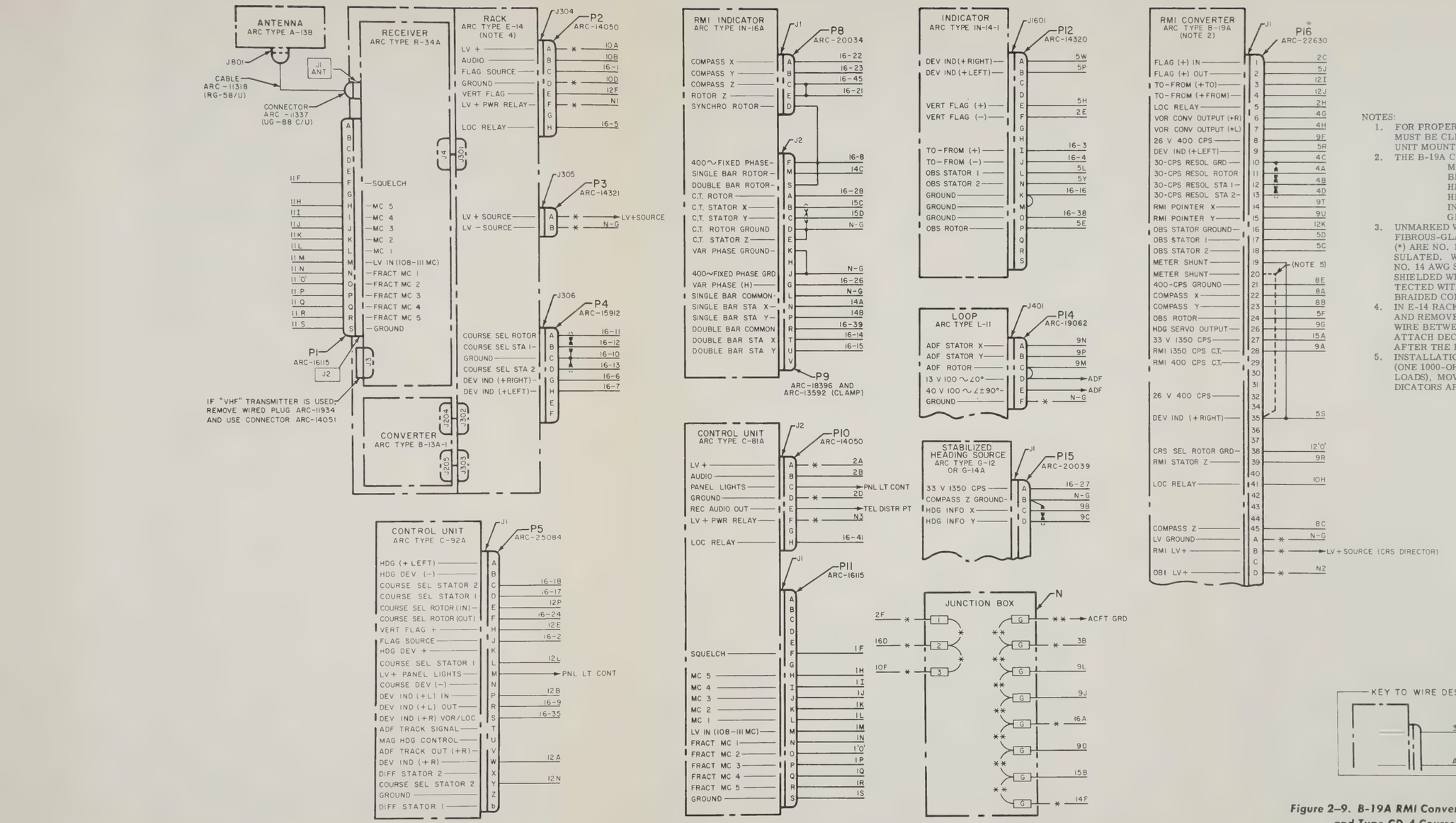
NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   - MODULATOR A1
   - BEARING SERVO AMPLIFIER A2
   - HEADING SERVO AMPLIFIER A3
   - HEADING FREQUENCY CONVERTER A4
   - INVERTER A5
   - GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.



27993B(TP)

Figure 2–9. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-4 Course Director, Interconnection Diagram



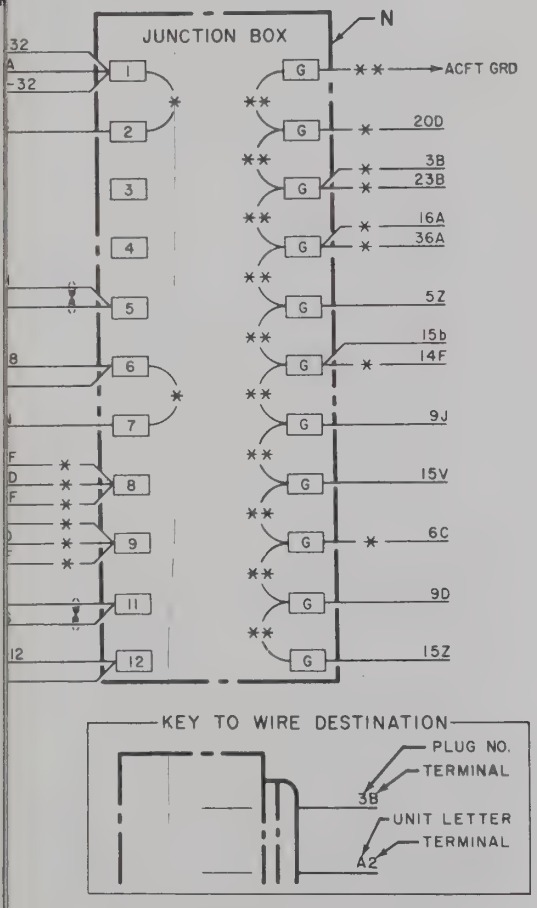
NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   - MODULATOR A1
   - BEARING SERVO AMPLIFIER A2
   - HEADING SERVO AMPLIFIER A3
   - HEADING FREQUENCY CONVERTER A4
   - INVERTER A5
   - GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.

Figure 2-9. B-19A RMI Converter, Type 15F VHF Navigation Equipment, and Type CD-4 Course Director, Interconnection Diagram

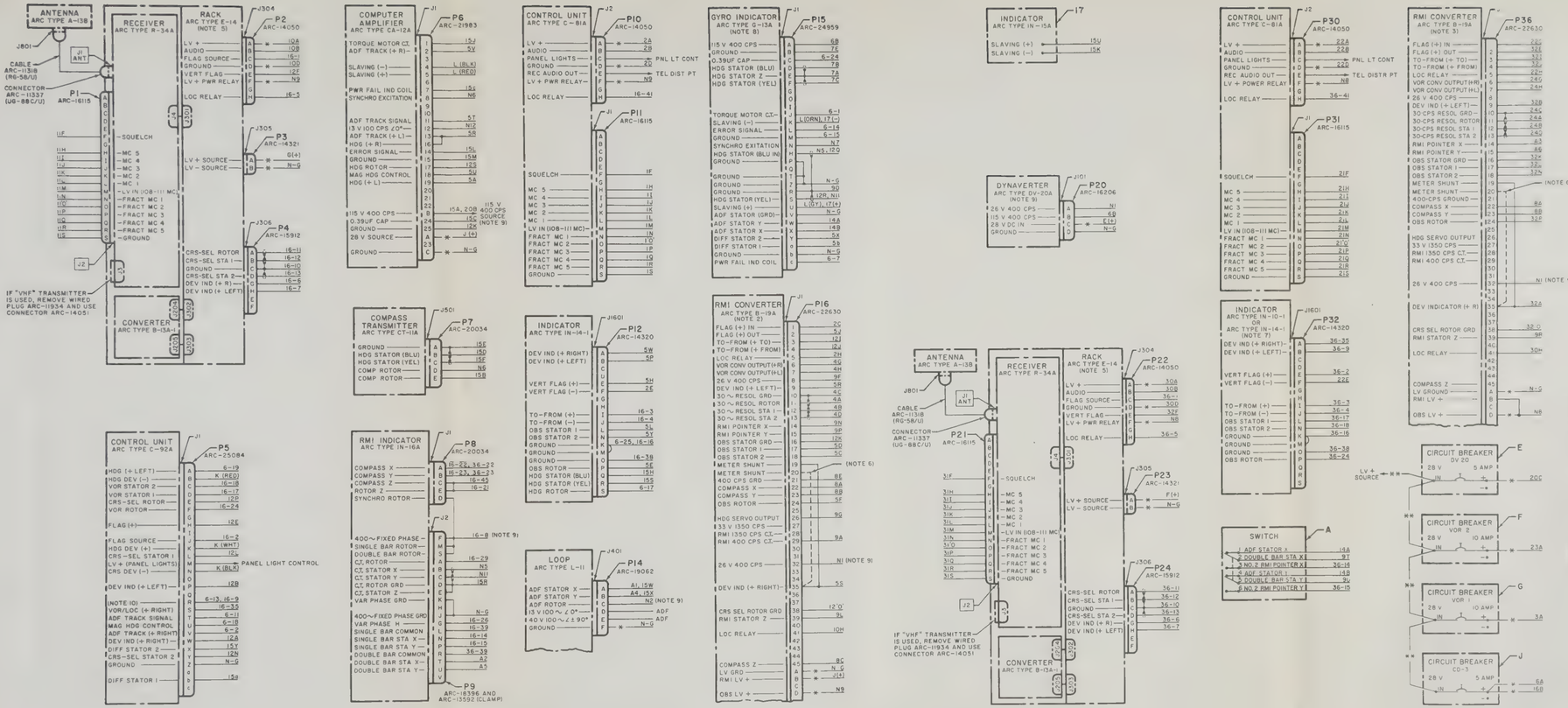
NG OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS
MOUNTINGS ARE FASTENED.
ECTED THROUGH P16 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
MODULATOR A1
BEARING SERVO AMPLIFIER A2
HEADING SERVO AMPLIFIER A3
GEARING ASSEMBLY A6
ECTED THROUGH P36 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
MODULATOR A1
BEARING SERVO AMPLIFIER A2
GEARING ASSEMBLY A6
NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH
O. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A
ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE
COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED

E RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK,
TWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION
ACK AFTER THE RESISTORS ARE REMOVED.
IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS
, MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE
R.
LAVED SYSTEMS.
DS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
ER FOR THE B-19A AND RMI MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS
AGE FOR THE STABILIZED HEADING SOURCE.
FOLLOWS:
VOR/LOC (+ LEFT)
ADF TRACK (+ LEFT)
HEADING (+ RIGHT)



27955B(TP)

Figure 2–10. Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-3 Course Director, Interconnection Diagram



NOTES:

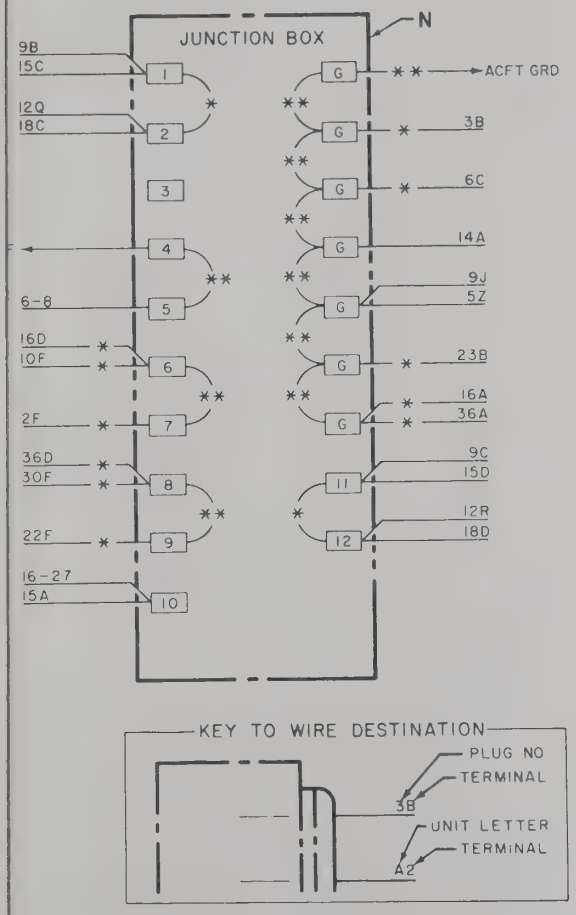
1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT-MOUNTINGS ARE FASTENED.
2. THE B-19A INTERCONNECTED THROUGH P16 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING/SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   GEARING ASSEMBLY A6
3. THE B-19A INTERCONNECTED THROUGH P36 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   GEARING ASSEMBLY A6
4. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
5. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
6. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
7. IN-10-1 IS USED IN UNSLAVED SYSTEMS.
8. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
9. 26-VOLT 400-CPS POWER FOR THE B-19A AND RMI MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.
10. WIRES TERMINATE AS FOLLOWS
    VOR/ LOC (+ LEFT)
    ADF TRACK (+ LEFT)
    HEADING (+ RIGHT)

27955B(TP)

Figure 2–10. Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-3 Course Director, Interconnection Diagram

ING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS
MOUNTINGS ARE FASTENED.
NECTED THROUGH P16 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
MODULATOR A1
BEARING SERVO AMPLIFIER A2
HEADING SERVO AMPLIFIER A3
HEADING FREQUENCY CONVERTER A4
INVERTER A5
GEARING ASSEMBLY A6
NECTED THROUGH P36 CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
MODULATOR A1
BEARING SERVO AMPLIFIER A2
GEARING ASSEMBLY A6
E NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH
NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A
) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE
D COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED

E RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK,
TWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION
RACK AFTER THE RESISTORS ARE REMOVED.
IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS
S), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE
ER.
DS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
FOLLOWS:
VOR/LOC (+ LEFT)
ADF TRACK (+ LEFT)
HEADING (+ RIGHT)



27957B(TP)

Figure 2–11. Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-4 Course Director, Interconnection Diagram

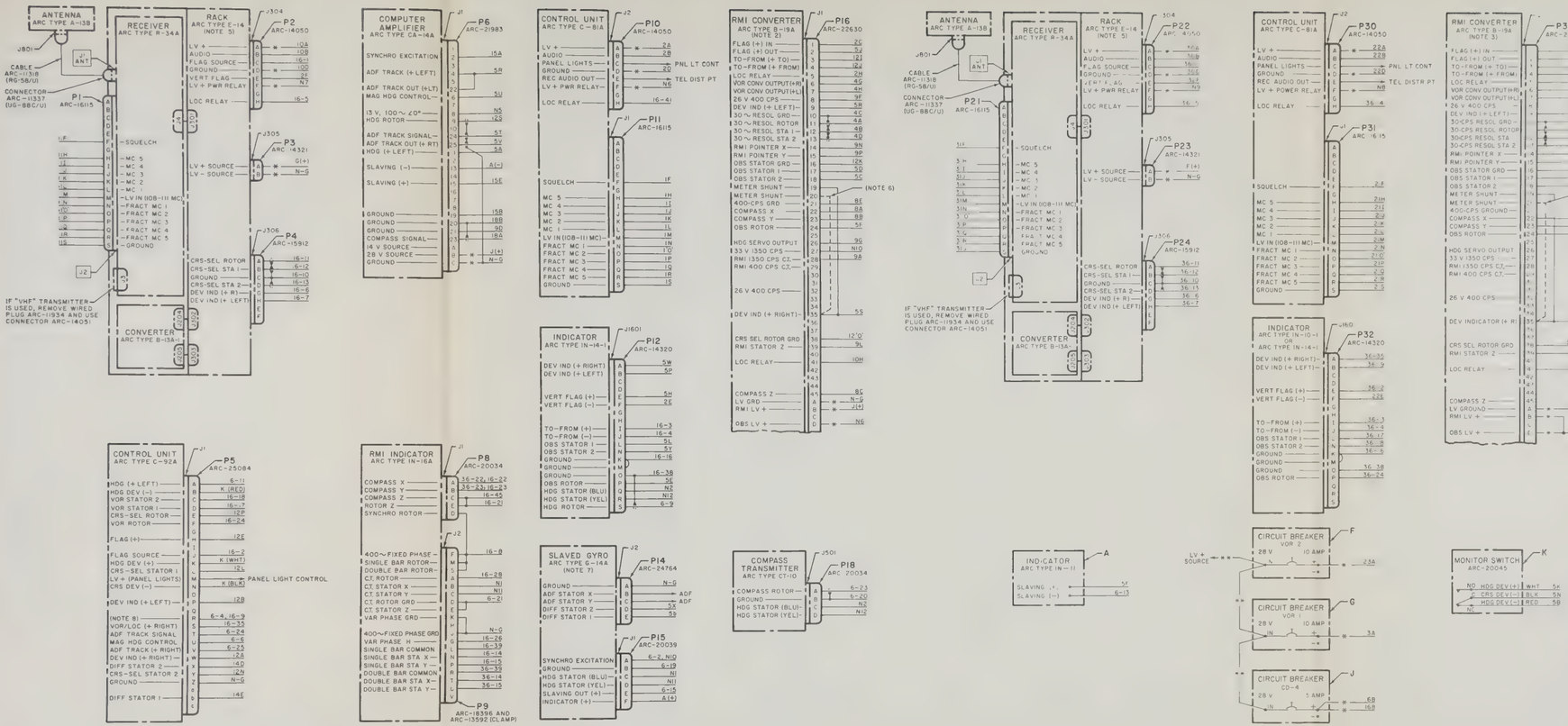
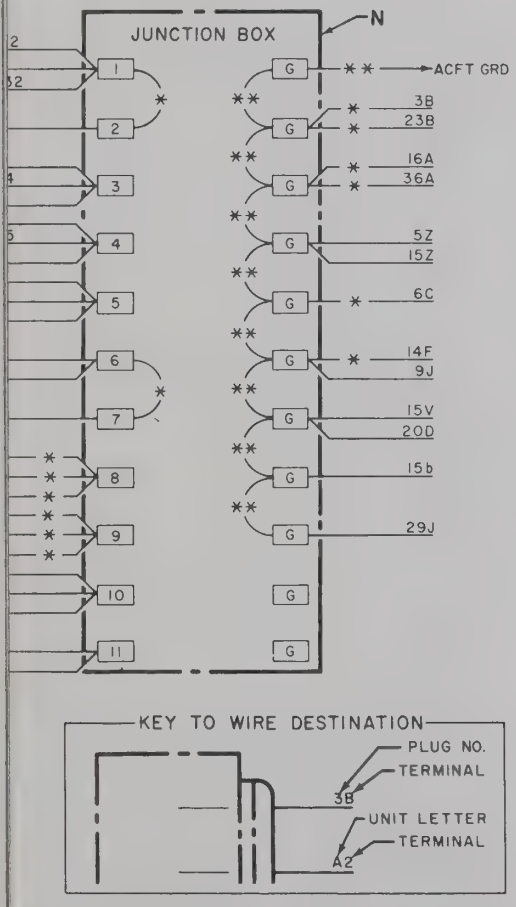


Figure 2-11. Dual Installation of B-19A RMI Converters and Type 15F VHF Navigation Equipments with IN-16A RMI Indicator, Type 21A ADF, and Type CD-4 Course Director, Interconnection Diagram

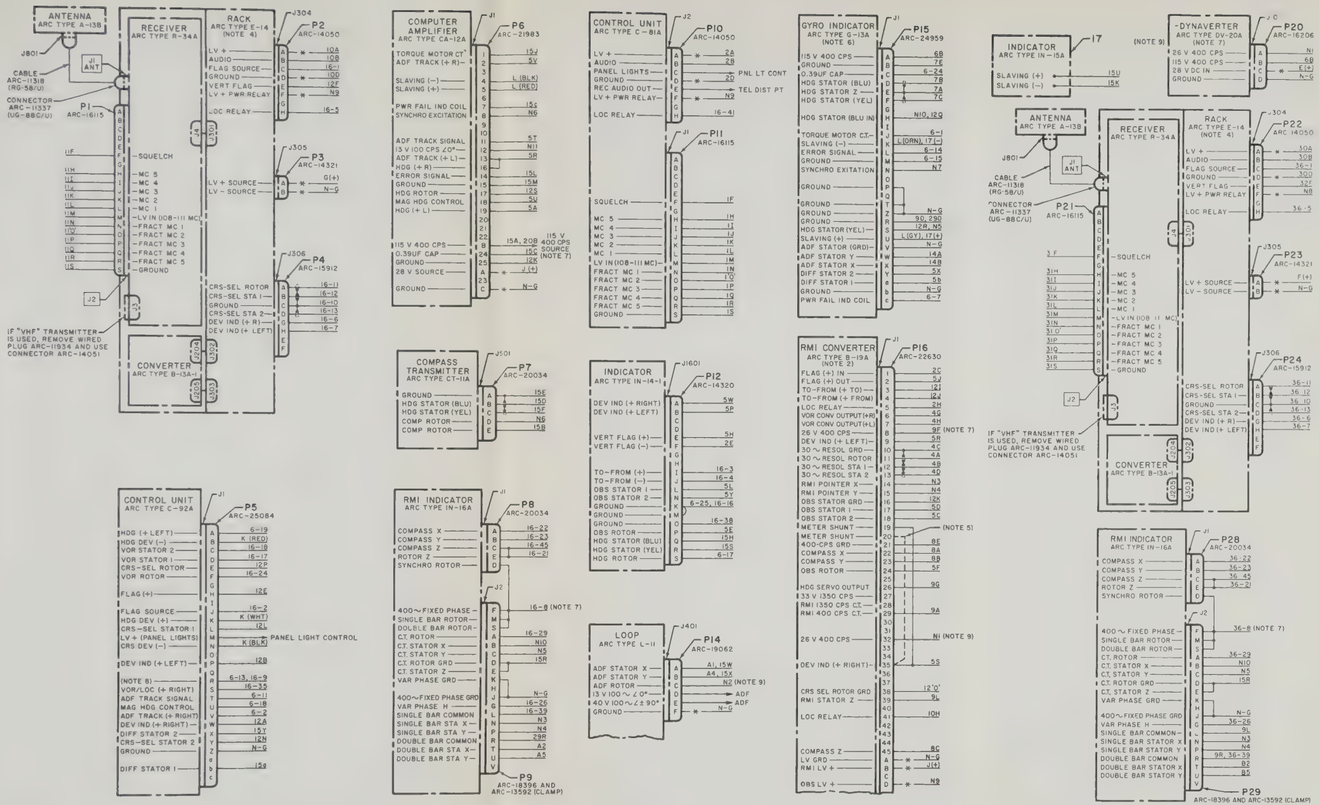
NG OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS
MOUNTINGS ARE FASTENED.
THE FOLLOWING PLUG-IN ASSEMBLIES:
MODULATOR A1
BEARING SERVO AMPLIFIER A2
HEADING SERVO AMPLIFIER A3
GEARING ASSEMBLY A6
NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH
O. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A
ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE
COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED

E RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK,
TWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION
RACK AFTER THE RESISTORS ARE REMOVED.
IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS
), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE
R.
DS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
ER FOR THE B-19A AND RMI MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS
TAGE FOR THE STABILIZED HEADING SOURCE.
FOLLOWS:
VOR/LOC (+ LEFT)
ADF TRACK (+ LEFT)
HEADING (+ RIGHT)



27959B(TP)

Figure 2–12. Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, IN-16A RMI Indicators, and Type 21A ADF's with Type CD-3 Course Director, Interconnection Diagram



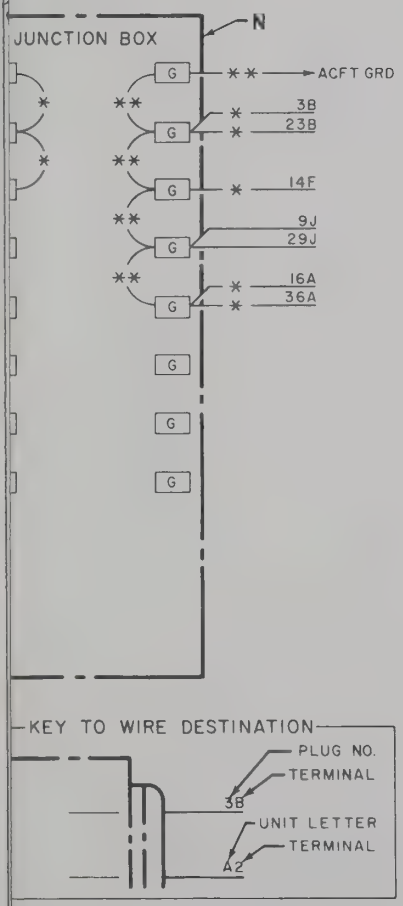
NOTES

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES:
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-22820 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.
7. 26-VOLT 400-CPS POWER FOR THE B-19A AND RMI MUST COME FROM THE SAME SOURCE AND PHASE (DIM) AS THE EXCITATION VOLTAGE FOR THE STABILIZED HEADING SOURCE.
8. WIRES TERMINATE AS FOLLOWS:
   VOR/LOC (+ LEFT)
   ADF TRACK (+ LEFT)
   HEADING (+ RIGHT)

Figure 2-12. Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, IN-16A RMI Indicators, and Type 21A ADF's with Type CD-3 Course Director, Interconnection Diagram

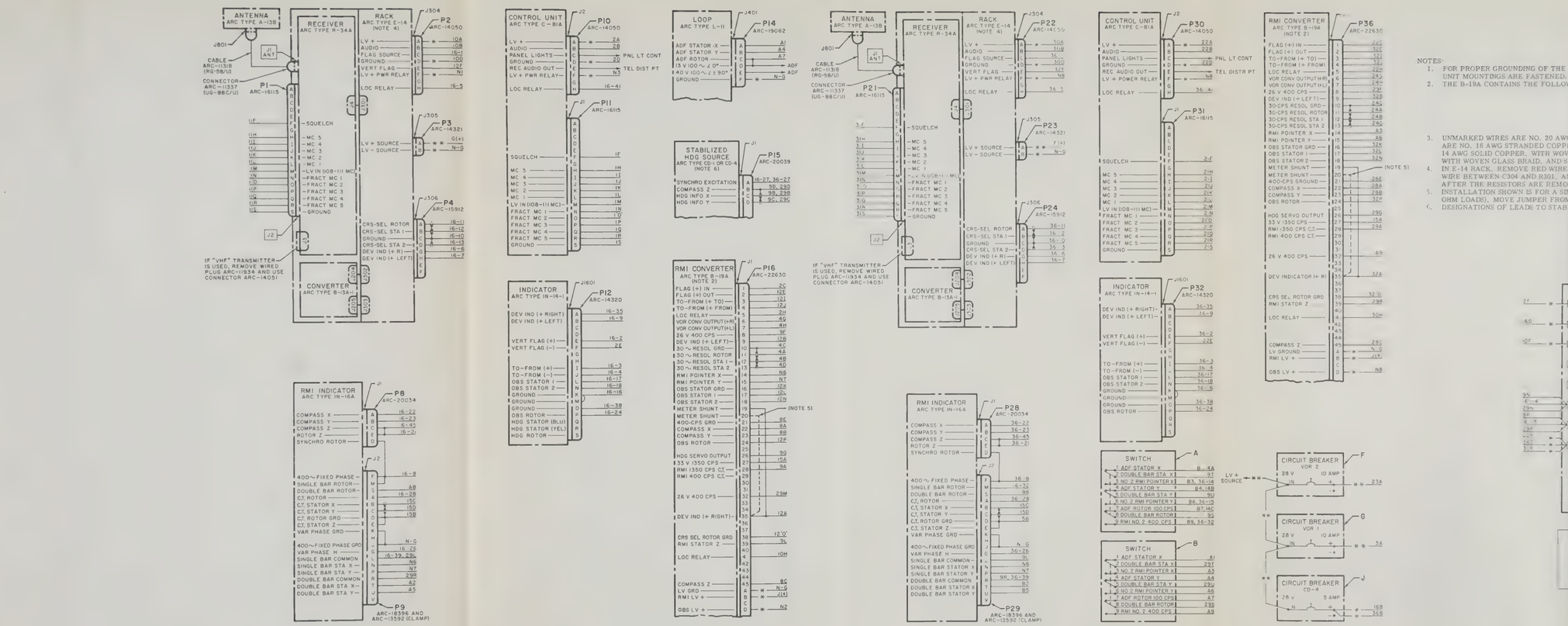
STEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR

G PLUG-IN ASSEMBLIES:
ODULATOR A1
EARING SERVO AMPLIFIER A2
EADING SERVO AMPLIFIER A3
EADING FREQUENCY CONVERTER A4
VERTER A5
EARING ASSEMBLY A6
TRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*)
FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO.
GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED
LDED WITH BRAIDED COPPER.
TWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED
REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK
D.
LE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-
INS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
ZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.



27956B(TP)

Figure 2–13. Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, and IN-16A RMI Indicators with Type 21A ADF and Type CD-1 or CD-4 Course Director, Interconnection Diagram



NOTES:

1. FOR PROPER GROUNDING OF THE SYSTEM, AIRCRAFT SURFACE MUST BE CLEAN, BARE METAL AT POINTS WHERE UNITS OR UNIT MOUNTINGS ARE FASTENED.
2. THE B-19A CONTAINS THE FOLLOWING PLUG-IN ASSEMBLIES
   MODULATOR A1
   BEARING SERVO AMPLIFIER A2
   HEADING SERVO AMPLIFIER A3
   HEADING FREQUENCY CONVERTER A4
   INVERTER A5
   GEARING ASSEMBLY A6
3. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH A DOUBLE ASTERISK (**) ARE NO. 14 AWG SOLID COPPER, WITH WOVEN GLASS BRAID. SHIELDED WIRES ARE NO. 20 AWG STRANDED COPPER, PROTECTED WITH WOVEN GLASS BRAID, AND SHIELDED WITH BRAIDED COPPER.
4. IN E-14 RACK, REMOVE RED WIRE BETWEEN C301 AND R301, AND REMOVE R301 AND R302. IN E-14A-1 RACK, REMOVE RED WIRE BETWEEN C304 AND R301, AND REMOVE R301 AND R302. ATTACH DECAL INFORMATION PLATE ARC-28269 TO RACK AFTER THE RESISTORS ARE REMOVED.
5. INSTALLATION SHOWN IS FOR A SINGLE DEVIATION INDICATOR (ONE 1000-OHM LOAD). FOR DUAL INDICATORS (TWO 1000-OHM LOADS), MOVE JUMPER FROM PINS 19 AND 35 TO PINS 20 AND 35. IF THREE INDICATORS ARE USED, REMOVE JUMPER.
6. DESIGNATIONS OF LEADS TO STABILIZED HEADING SOURCE IS IN ACCORDANCE WITH ARINC STANDARDS.

Figure 2-13. Dual Installation of B-19A RMI Converters, Type 15F VHF Navigation Equipments, and IN-16A RMI Indicators with Type 21A ADF and Type CD-1 or CD-4 Course Director, Interconnection Diagram

SECTION III
OPERATION

3–1. GENERAL.

Operation of the ARC Type B-19A RMI Converter is automatic upon application of d-c power or d-c and 400-cps power. Power is normally applied when the associated vhf navigation equipment and stabilized heading source are turned on.

3–2. RADIO MAGNETIC INDICATOR (RMI).

The B-19A RMI Converter provides the ARC Type IN-16A Radio Magnetic Indicator (see Figure 3–1) with aircraft heading and VOR bearing information. The IN-16A includes a rotating heading card, heading index, and two pointers. The heading card is controlled by the remote, stabilized heading source. The zero on the card represents magnetic north. As an aircraft changes heading, the heading card rotates to maintain the zero-degree = north relationship and the aircraft's new heading is indicated under the heading index. One pointer indicates the magnetic bearing of the VOR station as measured from magnetic north; that is, the magnetic heading the aircraft must fly to reach the station. The other pointer is used to indicate the magnetic bearing of a low-frequency station or a second VOR station in dual-VOR, single-RMI installations.

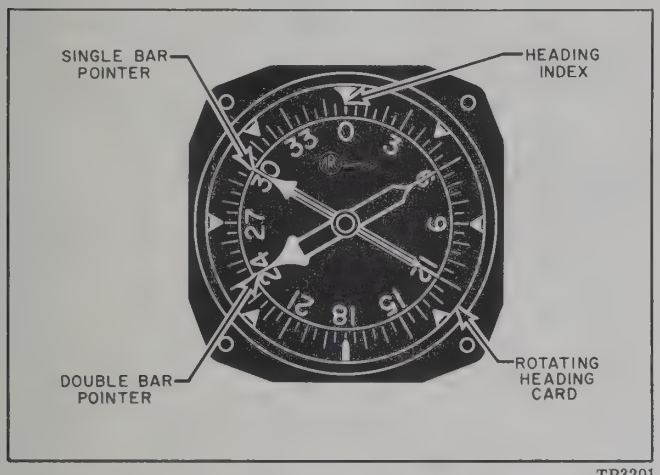


Figure 3–1. IN-16A Radio Magnetic Indicator

3–3. OPERATIONAL INDICATIONS.

Figure 3–2 shows typical RMI indications for an aircraft that has automatic direction finding (ADF) equipment and vhf navigation equipment. As indicated on the illustration, the RMI pointers continuously indicate the magnetic bearing the aircraft must fly to reach their respective station. The heading of the aircraft is indicated on the directional gyro (DG) and repeated under the heading index of the RMI. The relative bearing to a station is continuously indicated by the angular relationship of the appropriate pointer and the heading index. The continuous heading and bearing information enables the pilot to make rapid, continuous, position fixes and ground-speed checks, and simplifies course-interception procedures.

NOTES:

1. AT POSITION A, AIRCRAFT IS ON A MAGNETIC HEADING OF 90°. DIRECTIONAL GYRO (DG) AND RMI HEADING CARD READ 90°; SINGLE-BAR POINTER OF RMI INDICATES RELATIVE BEARING TO L-F STATION IS 30°, AND THAT A MAGNETIC HEADING OF 60° WILL TAKE THE AIRCRAFT DIRECTLY TO THE L-F STATION; DOUBLE-BAR POINTER OF RMI INDICATES RELATIVE BEARING TO VOR STATION IS 30°, AND THAT A MAGNETIC HEADING OF 120° WILL TAKE THE AIRCRAFT DIRECTLY TO THE VOR STATION.
2. AS AIRCRAFT CONTINUES ALONG LINE OF FLIGHT, RMI POINTERS CONTINUOUSLY INDICATE CHANGING RELATIVE BEARING TO THEIR RESPECTIVE RADIO STATION.
3. WHEN AIRCRAFT CHANGES HEADING AND REACHES POSITION B, AIRCRAFT'S NEW HEADING IS INDICATED ON RMI HEADING CARD AND DG, AND RMI POINTERS CONTINUE TO INDICATE RELATIVE BEARING TO THEIR RESPECTIVE RADIO STATION.

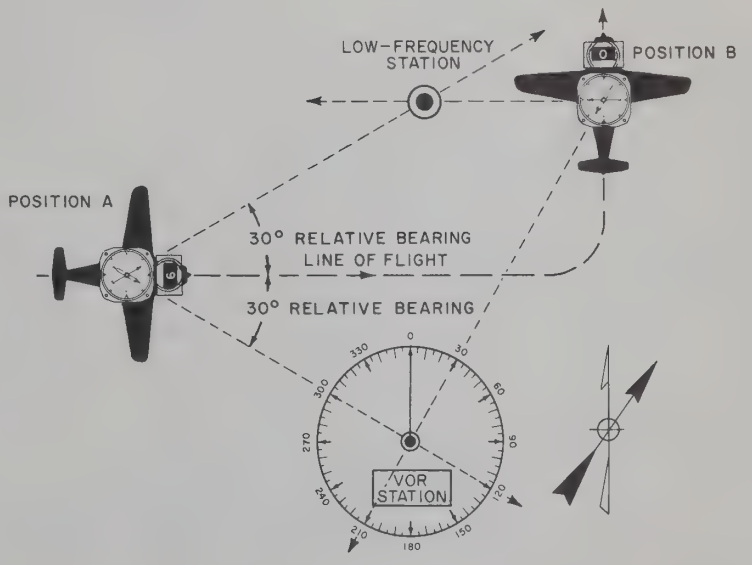
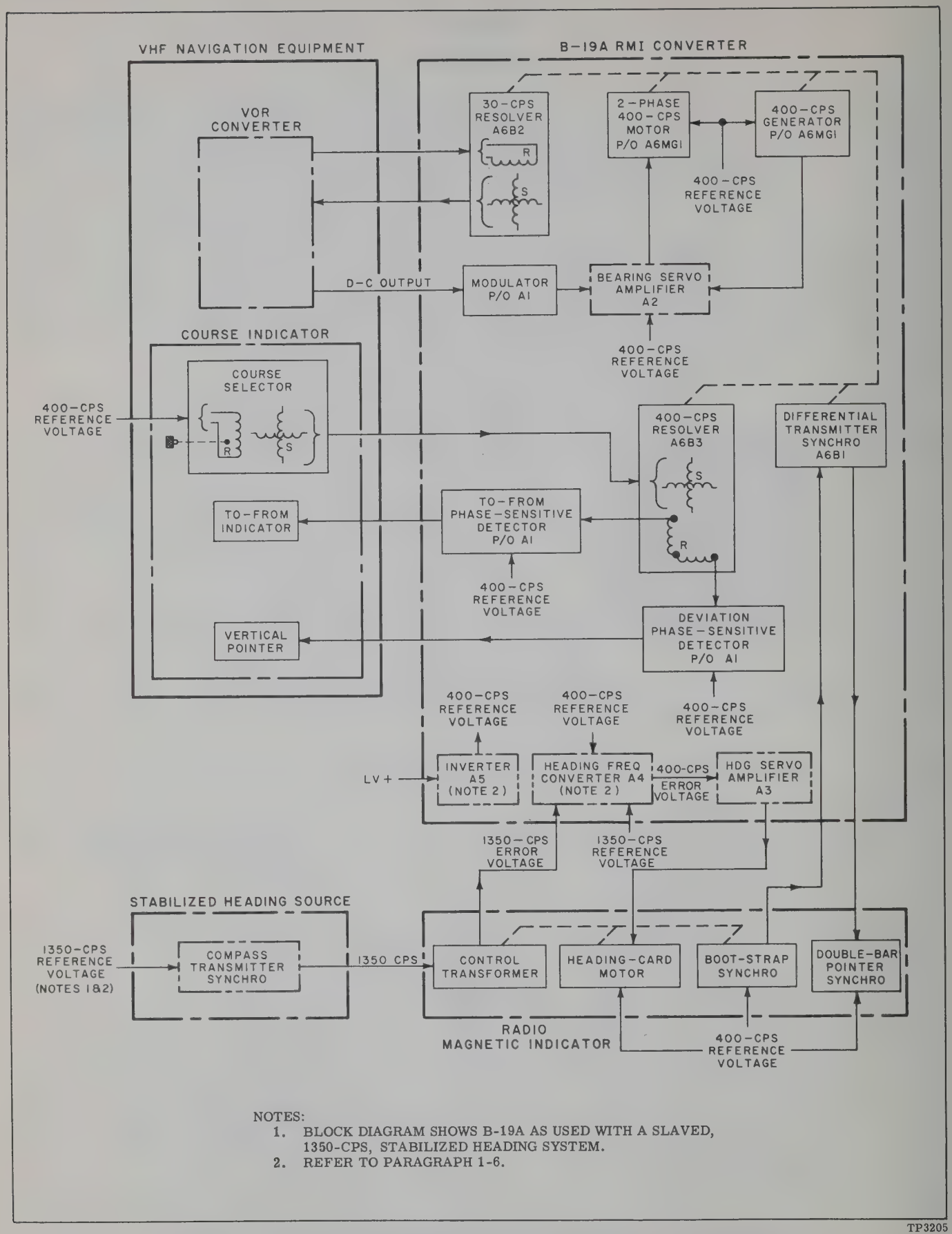


Figure 3–2. Typical RMI Indications



NOTES:
1. BLOCK DIAGRAM SHOWS B-19A AS USED WITH A SLAVED, 1350-CPS, STABILIZED HEADING SYSTEM.
2. REFER TO PARAGRAPH 1-6.

TP3205

Figure 4–1. B-19A RMI Converter and Associated Equipment, Block Diagram

SECTION IV
PRINCIPLES OF OPERATION

4–1. INTRODUCTION.

This section describes the principles of operation of the ARC Type B-19A RMI Converter when it is used with a 1350-cps, slaved, stabilized heading source. A block diagram of the RMI converter and associated equipment is shown in Figure 4–1.

4–2. FUNCTIONAL DESCRIPTION.

The B-19A RMI Converter is used with an ARC Type 15( ) VHF Navigation Equipment and a stabilized heading source such as the G-12, G-13A, or G-14A gyro. The VOR navigation equipment enables a pilot to select and maintain a desired course to or from a VOR station, or to determine his instantaneous bearing with respect to a VOR station. The addition of a B-19A RMI Converter and an ARC Type IN-16A RMI to the VOR system provides a pilot with continuous, simultaneous, aircraft-to-omnirange bearing information and aircraft heading information on one instrument.

In a VOR navigation system, a VOR converter applies a d-c voltage to a deviation indicator whenever the aircraft deviates from a selected course. The polarity of the d-c voltage depends on the position (left or right) of the aircraft with respect to the selected course; the amplitude of the voltage is proportional to the extent of the aircraft's deviation from the selected course. When RMI equipment is added to the VOR system, the d-c output of the VOR converter is applied to the modulator circuits of the B-19A rather than to the deviation indicator (see Figure 4–1).

The modulator, bearing servo amplifier, two-phase 400-cps motor, and 30-cps resolver of the B-19A constitute, with the VOR converter, a closed-loop servo system. If the position of the rotor in the 30-cps resolver does not agree with the position of the aircraft, a positive or negative d-c error signal is applied to the B-19A modulator circuits where it is converted to a 400-cps, positive- or negative-going, pulse signal (400-cps deviation signal) that is fed to the bearing servo amplifier.

The bearing servo amplifier increases the level of the 400-cps deviation signal and shifts the phase of the signal 90 degrees to provide the control winding of the two-phase 400-cps motor with a voltage that either leads or lags the 400-cps reference voltage by 90 degrees. When a deviation signal is applied to the motor, it rotates either clockwise or counterclockwise, depending on the phase of the deviation signal. As the motor rotates, it changes the angular position of the 30-cps resolver rotor, thereby reducing the d-c output of the VOR converter to zero. When the VOR converter output is zero, the deviation voltage produced by modulator A1 is also zero and the motor stops. The motor is part of a motor-generator combination, the output of the generator serving as a rate feedback for the bearing servo amplifier to reduce overshooting and hunting. When the output of the VOR converter is very large (aircraft off course by more than 8 degrees), the generator output is open-circuited, allowing the motor to run free, thereby permitting the vertical pointer of the course indicator and the VOR pointer of the RMI to follow rapid changes in the position of the aircraft with respect to the VOR station.

A differential transmitter synchro and a 400-cps resolver are mechanically coupled to the motor-generator. The differential transmitter synchro combines magnetic heading information from the compass transmitter synchro of the stabilized heading source (electrical input) with omnirange bearing information from the 30-cps resolver (mechanical input) and provides an electrical output that represents the instantaneous bearing of the aircraft with respect to the VOR station.

The 400-cps resolver of the B-19A is used with the course selector, deviation indicator, and to-from indicator of the vhf navigation equipment. The rotor of the course selector resolver is energized by the 400-cps reference voltage. This rotor voltage induces a voltage in each stator winding of the course selector; the amplitude and polarity of the induced voltages depends on the angular displacement of the rotor with respect to the individual stators. The stator voltages of the course indicator are applied to the stator windings of the 400-cps resolver where a magnetic field, identical to that produced in the course selector, is developed. The field developed by the 400-cps resolver stator produces a voltage in the rotor of the resolver when the angular displacement of the rotor is not identical to that of the course selector rotor. When the aircraft is on a selected course, the angular displacement of the course selector rotor and the 400-cps resolver rotor are identical. If the aircraft is not on a selected course, the two-phase, 400-cps motor drives the 400-cps resolver rotor to a position different from that

of the course selector rotor and an error voltage is developed in the 400-cps resolver. The error voltage is applied to the deviation phase-sensitive detector where it is converted to a d-c signal that is applied to the vertical pointer of the course indicator. The error voltage developed in the resolver rotor is also applied to the to-from phase-sensitive detector where it is converted to a d-c signal that is applied to the to-from meter of the course indicator.

The heading frequency converter and heading servo amplifier of the B-19A, the control transformer and heading-card motor of the RMI, and the compass transmitter synchro in the stabilized heading source constitute a closed-loop servo system. When the aircraft maintains a given heading, the rotor of the compass transmitter synchro and the rotor of the control transformer maintain the same angular displacement with respect to their associated stator windings. As the aircraft changes its heading, however, the angular displacement of the compass transmitter synchro rotor changes and a 1350-cps error voltage is developed in the rotor of the RMI control transformer. The 1350-cps error voltage, which either leads or lags the 1350-cps reference voltage by 180 degrees, is applied to the heading frequency converter where it is changed to a 400-cps error signal. The phase of the 400-cps error signal is the same, with respect to the 400-cps reference voltage, as the phase of the 1350-cps error signal, with respect to the 1350-cps reference voltage. The 400-cps error signal is applied through the heading servo amplifier to the RMI heading-card motor. The error signal causes the motor to rotate, driving the heading card, control transformer rotor, and the rotor of the bootstrap synchro of the RMI.

As the rotor of the control transformer rotates, the difference between its angular displacement and the angular displacement of the compass transmitter synchro rotor is reduced. When the aircraft maintains a new heading, the control transformer rotor is driven by the motor until the angular displacement of the rotor is identical to that of the compass transmitter synchro rotor. When the angular displacement of each rotor is identical, the 1350-cps error voltage becomes zero and the heading-card motor stops.

When the heading-card motor is actuated by a 400-cps error signal, the rotor of the bootstrap synchro is driven to a new position. The new rotor position changes the output of the bootstrap synchro. Since a change in the output of the bootstrap synchro produces a corresponding change in the output of the differential transmitter synchro, and since the output of the differential transmitter synchro is applied to the stator of the RMI double-bar pointer synchro, a change in the angular displacement of the bootstrap synchro rotor produces a corresponding change in the angular displacement of the pointer synchro rotor. The double-bar pointer of the RMI is attached to the rotor of the double-bar pointer synchro and, therefore, a change in the angular displacement of the bootstrap synchro rotor causes the RMI pointer to move in step with the heading card and thereby maintain the magnetic and relative bearing indications regardless of the heading of the aircraft.

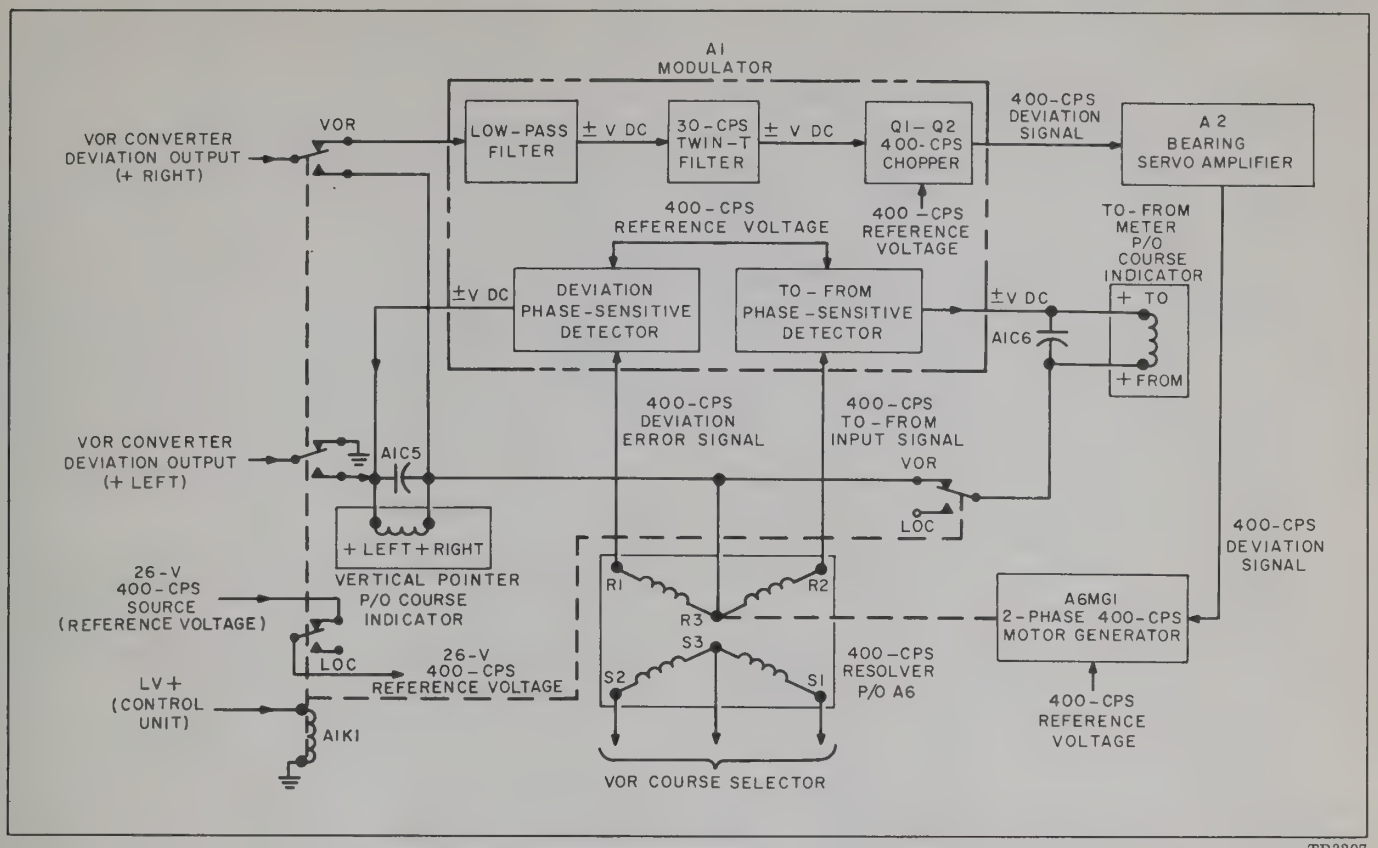
The inverter assembly of the B-19A provides 400-cps power for the B-19A and the RMI when the B-19A is used with a 1350-cps stabilized heading system in aircraft that do not contain a 400-cps power source. When the B-19A is used with a 400-cps stabilized heading system, the inverter is not used. In its place, a 400-cps supply such as the ARC Type DV-20A Dynaverter is required to supply 400-cps power to the complete navigation system.

4–3. MODULATOR A1.

Modulator assembly A1, shown in Figure 4–2, converts d-c deviation signals of the VOR converter to a 400-cps deviation signal. The assembly contains low-pass filter circuits, a d-c to 400-cps a-c chopper, phase-sensitive detectors for the vertical pointer and the to-from meter of the course indicator, and a VOR-LOC switching relay. When the navigation equipment is tuned to a VOR frequency, the d-c output of the VOR converter is applied through the low-pass filter and the 30-cps twin-T filter to the 400-cps chopper. The filters provide a "clean" d-c voltage for the 400-cps chopper stage. The chopper operates as an automatically-variable voltage divider, the resistance of which varies at the 400-cps reference-voltage rate. This type of circuit provides a pulsed output with the same frequency as the applied reference voltage and the polarity of the applied d-c voltage.

As shown in Figure 6–1, the 400-cps reference voltage is transformer-coupled to the bases of Q1 and Q2, and the filtered positive or negative d-c voltage is impressed across Q1 and Q2. The 400-cps voltage alternately changes the bias and therefore also changes the resistance of the transistors from a forward bias (low resistance) to a reverse bias (high resistance). Since the output of the stage is taken from the midpoint of the two series-connected transistors, and since the resistance of the individual transistors varies at a 400-cps rate, the output point of the stage effectively moves between the d-c input point (Q1 resistance low, Q2 resistance high) and ground (Q1 resistance high, Q2 resistance low), and the output voltage, therefore, varies between the value of the d-c input voltage and zero at the 400-cps rate.

The pulsed output (400-cps deviation signal) of the chopper is applied through the bearing servo amplifier to the two-phase 400-cps motor generator A6MG1. The 400-cps deviation signal causes the motor to rotate, changing the angular displacement of the 400-cps resolver rotor, and thereby producing a 400-cps deviation



TP3207

Figure 4–2. Modulator Assembly A1, Block Diagram

error signal and a change in the 400-cps to-from input signal.

The deviation error signal is applied to the deviation phase-sensitive detector. The detector produces a d-c output that is proportional in amplitude to the amplitude of the deviation error signal; the polarity of the d-c output is determined by the polarity of the deviation error signal with respect to the 400-cps reference voltage. For example, if the aircraft is flying the selected bearing to the VOR station, the angular displacement of the 400-cps resolver rotor will be the same as that of the course selector rotor, the 400-cps error signal applied to the deviation phase-sensitive detector will be zero, and the vertical pointer will be centered. If the aircraft is off course, or if an off-course radial is selected, however, a 400-cps deviation error signal will be developed and applied to the deviation phase sensitive detector, a plus-or minus d-c voltage will be produced and applied to the vertical pointer, and the vertical pointer will move off center, indicating the direction the aircraft must fly to reach the desired course.

The operation of the to-from phase-sensitive detector is similar to the operation of the deviation phase-sensitive detector. However, the 400-cps to-from input signal, obtained from the rotor of the 400-cps resolver, is always 90 degrees out of phase with respect to the 400-cps deviation error signal. Because of this quadrature relationship, the to-from input signal is maximum when the deviation error signal is zero (aircraft on a selected course) and zero when the deviation error signal is maximum (aircraft 90 degrees off a selected course). When the to-from input signal is maximum, the plus-or minus-d-c output of the to-from phase-sensitive detector is maximum, and a "solid" TO or FROM signal produced.

When the navigation equipment is tuned to a localizer frequency, LV+ is applied from the control unit of the navigation equipment to the coil of relay A1K1, energizing the relay. When A1K1 is energized, the d-c output of the VOR converter is applied directly to the vertical pointer of the course indicator and the 400-cps reference voltage is removed from the B-19A circuits, making the B-19A inoperative.

4–4. BEARING SERVO AMPLIFIER A2.

The bearing servo amplifier, shown in Figure 4–3, modifies the 400-cps output of modulator assembly A1 to provide the motor of the two-phase 400-cps motor-generator A6MG1 with a 400-cps driving voltage. The bearing servo amplifier also contains flag control circuits that control the application of hold-down voltage to the warning flag of the course indicator and the application of the 400-cps rate-feedback signal to the amplifier circuits of the bearing servo amplifier.

The 400-cps output of modulator assembly A1 is applied to impedance matching amplifier Q1. In addition to the modulator assembly output signal, a controlled amount of degenerative feedback is applied to Q1 to prevent motor A6MG1B1 from overshooting its null position. Q1 increases the voltage level of the 400-cps signal and provides the high (in) to low (out) impedance matching required by voltage amplifier Q2. The output of Q1 is applied through voltage amplifiers Q2 and Q3 and series-connected class B power amplifiers Q4 and Q5 to the control winding of motor A6MG1B1.

The 400-cps output of the power amplifier is shifted 90 degrees by capacitor C11 to provide a quadrature phase relationship between the control-winding voltage (400-cps deviation signal) and the main-winding voltage (400-cps reference voltage) of motor A6MG1B1.

The bearing servo amplifier also controls the course indicator warning flag and the application of the rate feedback signal to the bearing servo amplifier circuits. As shown in Figure 4–3, the output of Q2 is applied through a portion of flag sensitivity control R15 to relay control amplifier A7. When the aircraft is within 8 degrees of a selected VOR course, Q7 is biased to cutoff, relay switch Q6 conducts, flag relay A7K1 is energized, the VOR flag circuit is completed through normally open contacts of Q7K1, and the warning flag is held out of sight by the flag current. If the aircraft is more than 8 degrees off course, Q7 conducts, Q6 is biased to cutoff, relay A7K1 is de-energized, the flag and rate-feedback circuits are broken, the warning flag shows, and motor A6MG1 is not slowed by the effects of the degenerative rate-feedback signal. The bias on flag switch Q6 is also controlled by the 26-volt, 400-cps power source. If the power source fails, Q6 will be cut off and the warning flag will show, regardless of the position of the aircraft with respect to the selected VOR course.

4–5. HEADING SERVO AMPLIFIER A3.

The heading servo amplifier increases the level of 400-cps heading error signals to the level required by the RMI heading-card motor. Assembly A3 consists of an input limited stage, two voltage amplifier stages, a series-connected class B power amplifier stage, and a feedback circuit. Only 400-cps signals are applied to the heading servo amplifier. As shown in Figure 4–4, heading frequency converter A4 is used when the frequency of the heading error signal is 1350 cps; when the heading error signal has a frequency of 400 cps, the output of the RMI control transformer is applied directly to assembly A3.

In operation, the heading of the aircraft determines the position of the compass transmitter rotor. The position of the compass transmitter rotor, in turn, determines the phase of the heading signal. When the heading of the aircraft is changing, the angular displacement of the compass transmitter changes, the phase of the heading signal changes, and the rotor of the RMI control transformer, which has not yet changed its angular position, develops a heading error voltage. This error voltage is applied, either directly (400-cps systems) or through a heading frequency converter (1350-cps systems), to the limiter stage and the first voltage amplifier stage of the heading servo amplifier.

The limiter circuit clips the error signal at 0.3 volt to provide for uniform operation of the RMI heading card, regardless of the type of compass transmitter used with the B-19A. The clipped error signal is amplified by voltage amplifiers Q1 and Q2 and by series-connected class B power amplifiers Q3 and Q4 to the level required by the heading-card motor.

Degenerative feedback is applied through heading servo feedback control R3 to the first voltage amplifier stage. This feedback controls the gain of the assembly and is adjusted to provide heading-card movement that is neither too sluggish nor too rapid. If the heading card moves sluggishly, it will lag the actual heading change of the aircraft. If the card moves too rapidly, it will overshoot and hunting will occur each time the card moves to indicate a new heading.

The output of assembly A3 is applied to the control winding of the RMI heading-card motor, causing the motor to rotate and change the position of the RMI heading card and the rotor of the RMI control transformer. As long as the aircraft is changing heading, a heading error signal is developed by the control transformer and the heading-card motor continues to operate. When the aircraft maintains a new heading, the heading-card motor continues to operate until the rotor of the control transformer nulls the error voltage. When heading servo feedback control R3 is properly adjusted, there is no apparent lag between an aircraft heading change and the heading indication on the RMI. If R3 is improperly adjusted, there will be either a noticeable lag between an aircraft heading change and the heading indication, or the heading card will closely follow an aircraft heading change but it will oscillate around each new heading indication.

4–6. HEADING FREQUENCY CONVERTER A4.

The heading frequency converter is required when the B-19A is used with a 1350-cps stabilized heading source. The assembly provides the heading servo amplifier with a positive- or negative-going, 400-cps, pulsed heading error signal whenever the aircraft is changing its heading. The output of the assembly is either in phase (positive-going) or 180 degrees out of phase (negative-going) with respect to a 400-cps reference voltage. The polarity of the output voltage depends on the phase of the 1350-cps heading error signal with respect to the 1350-cps reference voltage.

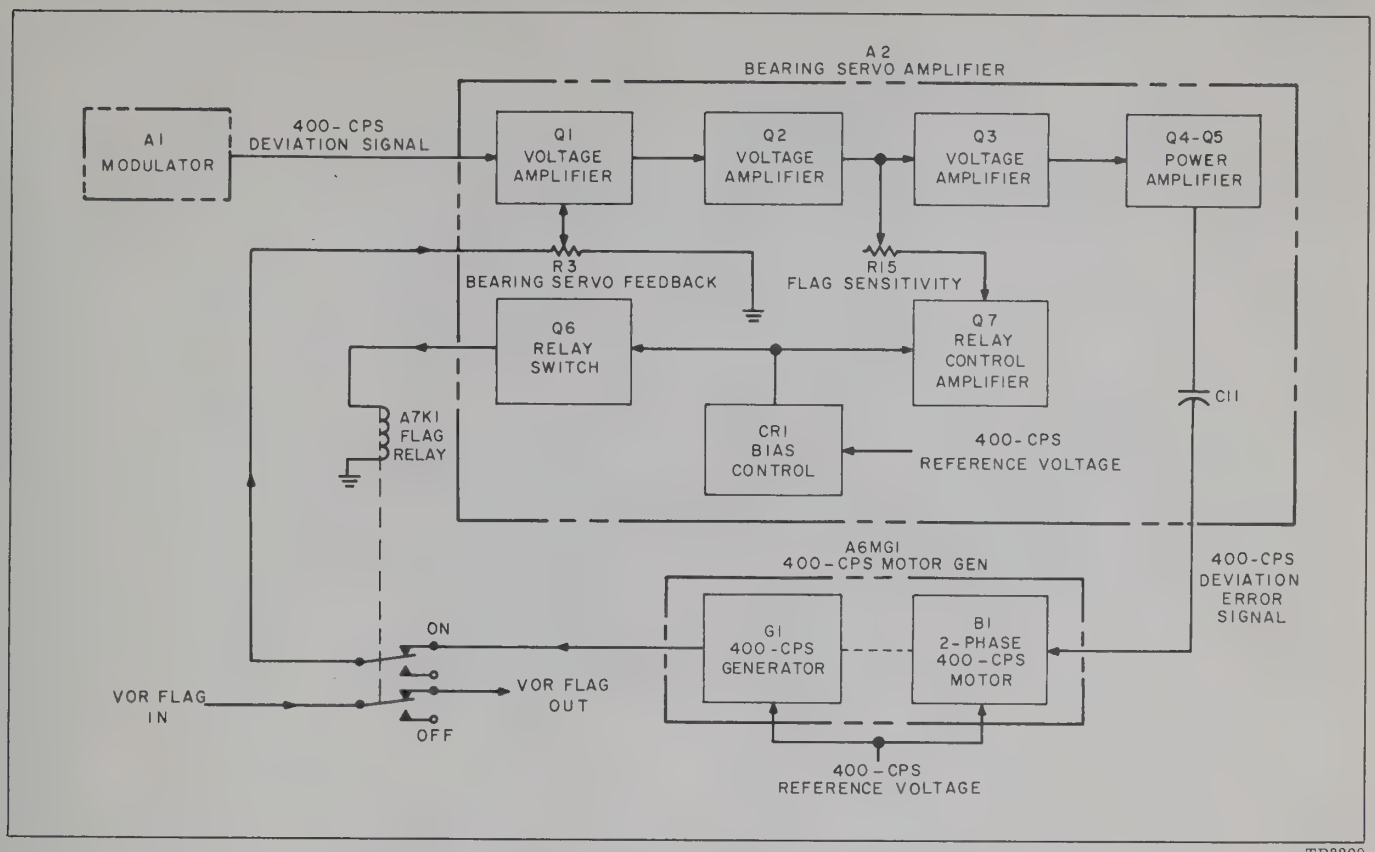


Figure 4–3. Bearing Servo Amplifier A2, Block Diagram

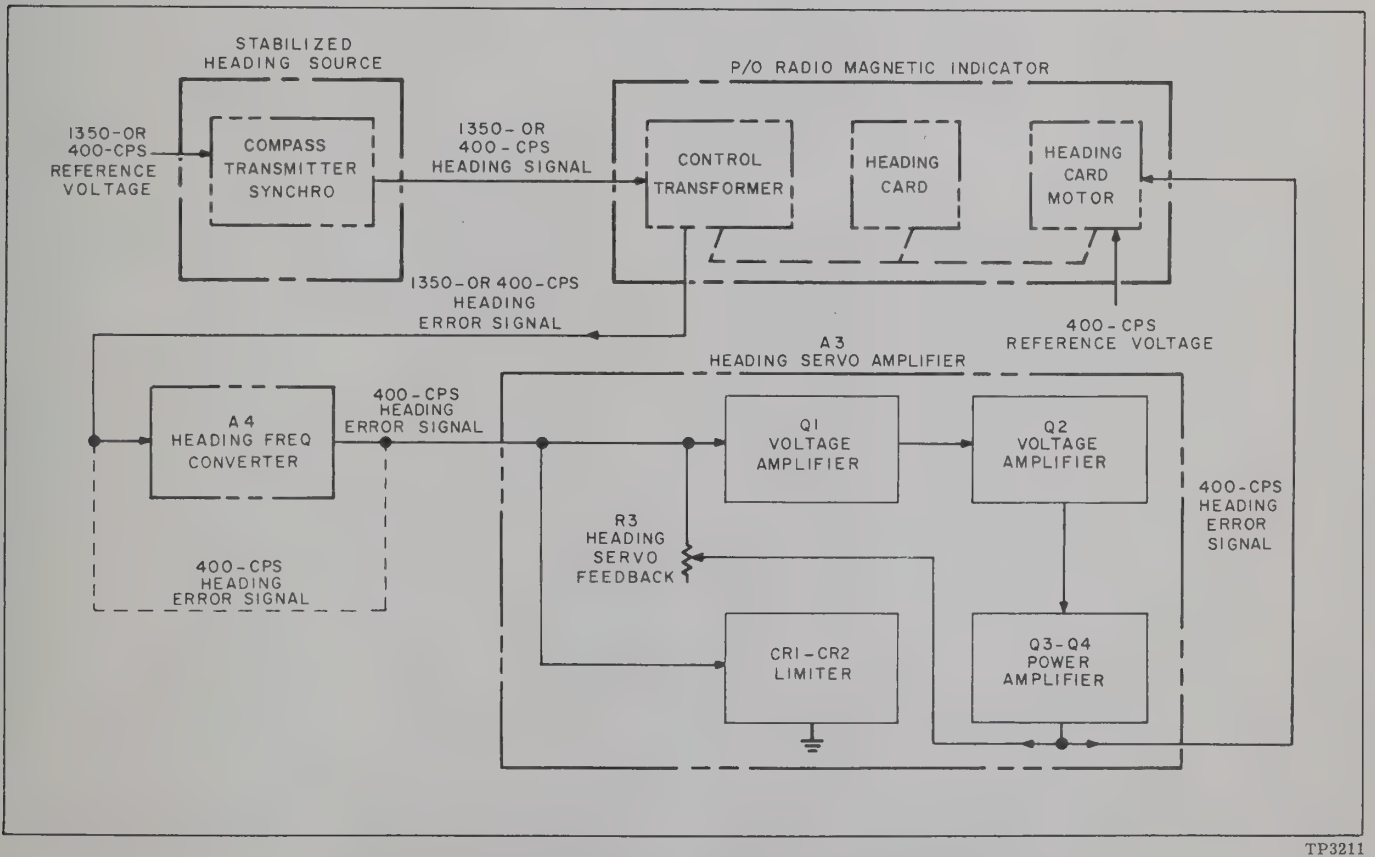
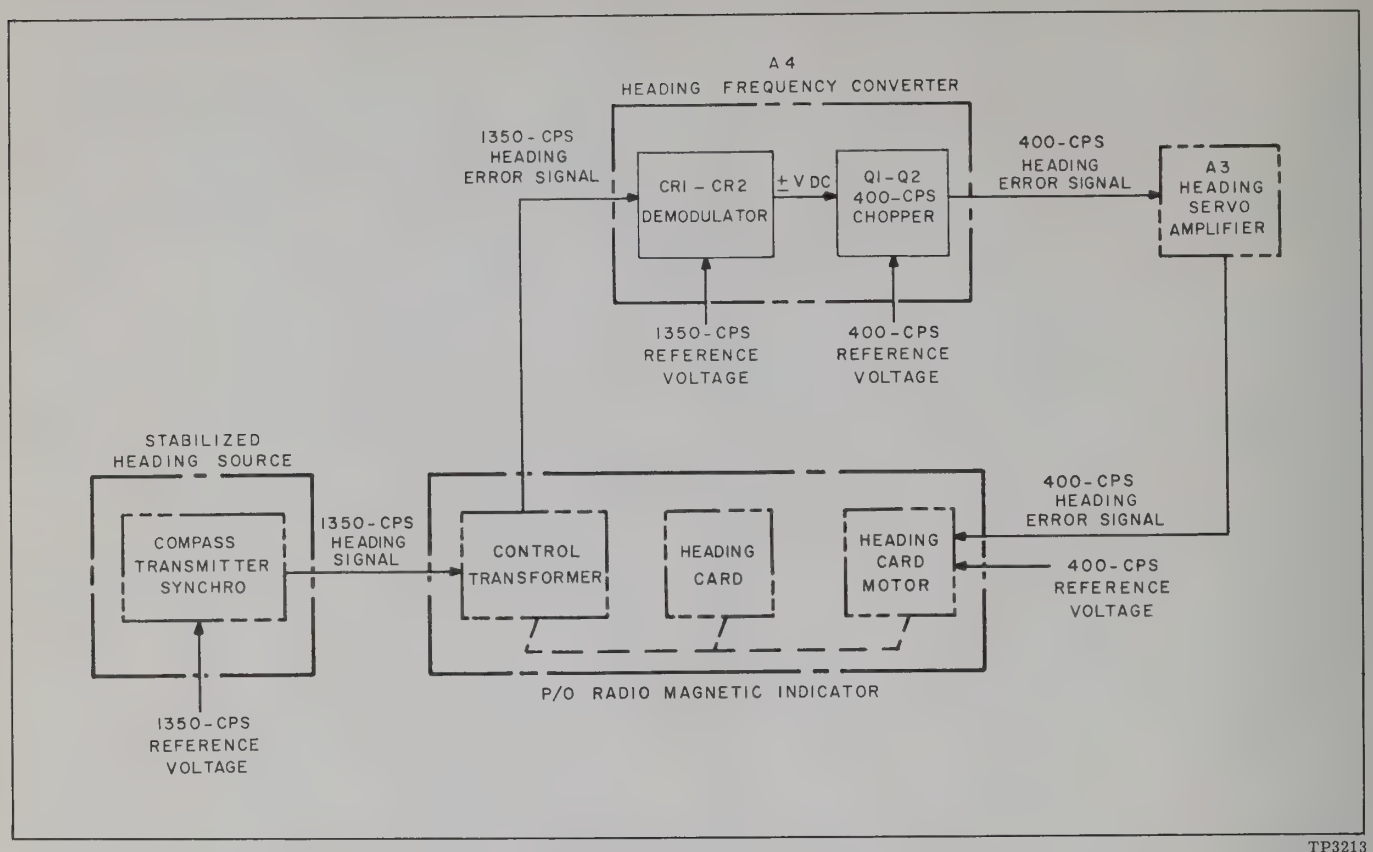
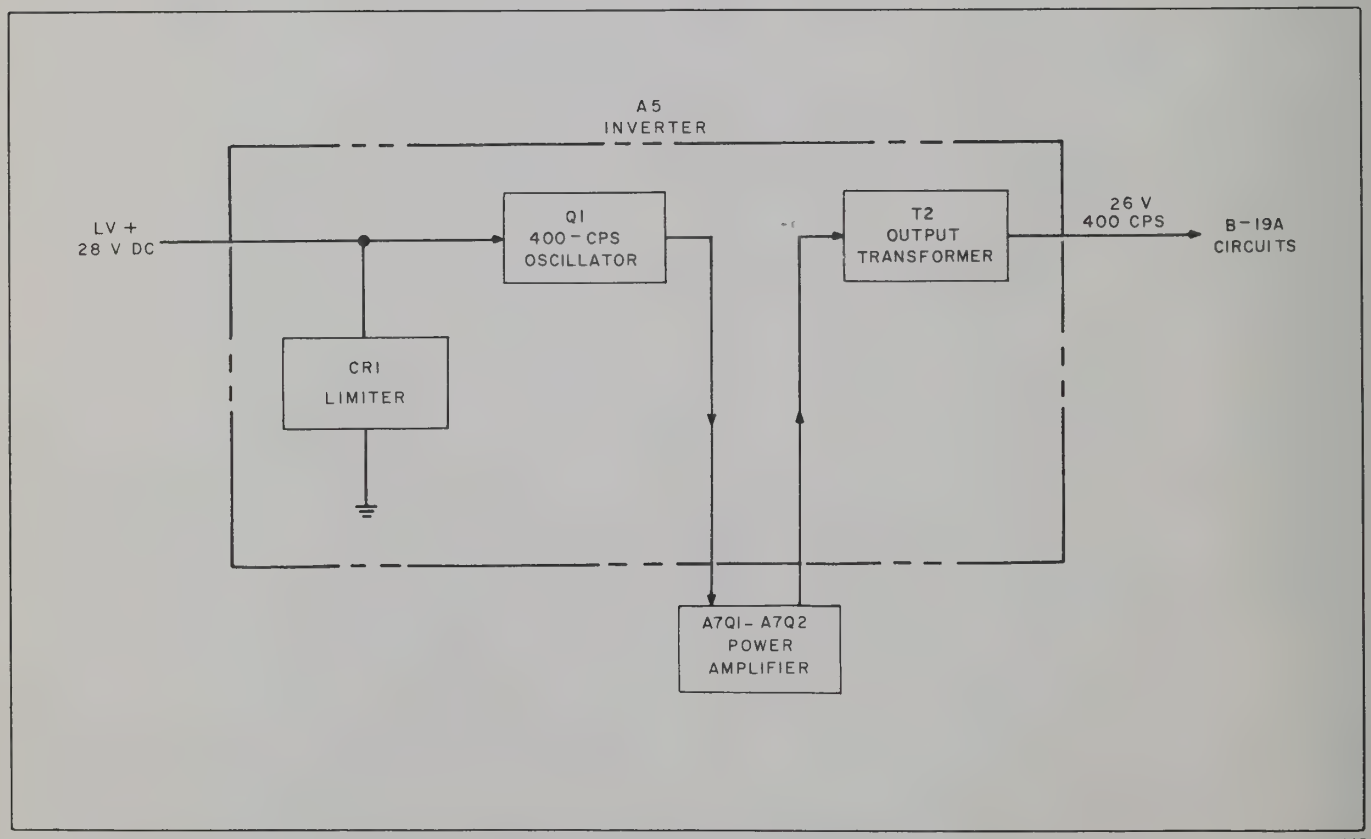


Figure 4–4. Heading Servo Amplifier A3, Block Diagram



TP3213

Figure 4–5. Heading Frequency Converter A4, Block Diagram



TP3215

Figure 4–6. Inverter A5, Block Diagram

As shown in Figure 4–5, assembly A4 consists of a demodulator (phase-sensitive detector) stage and a 400-cps chopper stage. The demodulator produces a positive or negative d-c output when a 1350-cps heading error signal is developed in the control transformer of the RMI. The polarity of the d-c output depends on the polarity of the 1350-cps heading error signal. When the heading error signal is in phase with the reference voltage, the d-c output is positive; when the heading error signal is 180 degrees out of phase with the reference voltage the d-c output is negative. The 400-cps chopper operates as an automatically-variable voltage divider, the resistance of which varies at the 400-cps reference-voltage rate. As shown in Figure 6–1, the 400-cps reference voltage is transformer-coupled to the bases of Q1 and Q2, and the d-c output of the demodulator is impressed across Q1 and Q2. The 400-cps voltage alternately changes the bias and therefore also changes the resistance of the transistors from a forward bias (low resistance) to a reverse bias (high resistance). Since the output of the stage is taken from the midpoint of the two series-connected transistors, and since the resistance of the individual transistors varies at a 400-cps rate, the output point of the stage effectively moves between the d-c input point (Q1 resistance low, Q2 resistance high) and ground (Q1 resistance high, Q2 resistance low), and the output voltage of the chopper, therefore, varies between the value of the d-c input voltage and zero at the 400-cps rate.

4–7. INVERTER A5.

The inverter assembly, shown in Figure 4–6, is required when the B-19A is used with a 1350-cps, slaved, stabilized heading source or with a 400-cps unslaved, stabilized heading source. The assembly consists of a 400-cps sine-wave oscillator and an output transformer. The output of 400-cps oscillator A5Q1 is transformer-coupled to push-pull power amplifier A7Q1 and A7Q2. The output of the power amplifier stage is coupled to the B-19A circuits and the RMI, and, if applicable, the unslaved, stabilized heading source.

SECTION V
MAINTENANCE

5–1. INTRODUCTION.

This section contains test equipment data, removal and replacement procedures, performance test procedures, trouble analysis information, and voltage measurement data for the ARC Type B-19A RMI Converter. An interior view (Figure 5–2) is included to help service personnel locate assemblies and adjustment points. Schematic and wiring diagrams required for trouble-shooting and locating details are included in Section VI. A list of replaceable parts for the B-19A is included in Section VII.

5–2. TEST EQUIPMENT.

Table 5–1 lists the test equipment required for maintenance of the B-19A; equivalent test equipment may be substituted. Cable Assembly ARC-28145, shown schematically in Figure 5–1, is required to permit continued operation of the Type 15( ) equipment if a J-17A Junction Box is not included in the system installation and the B-19A is removed for maintenance.

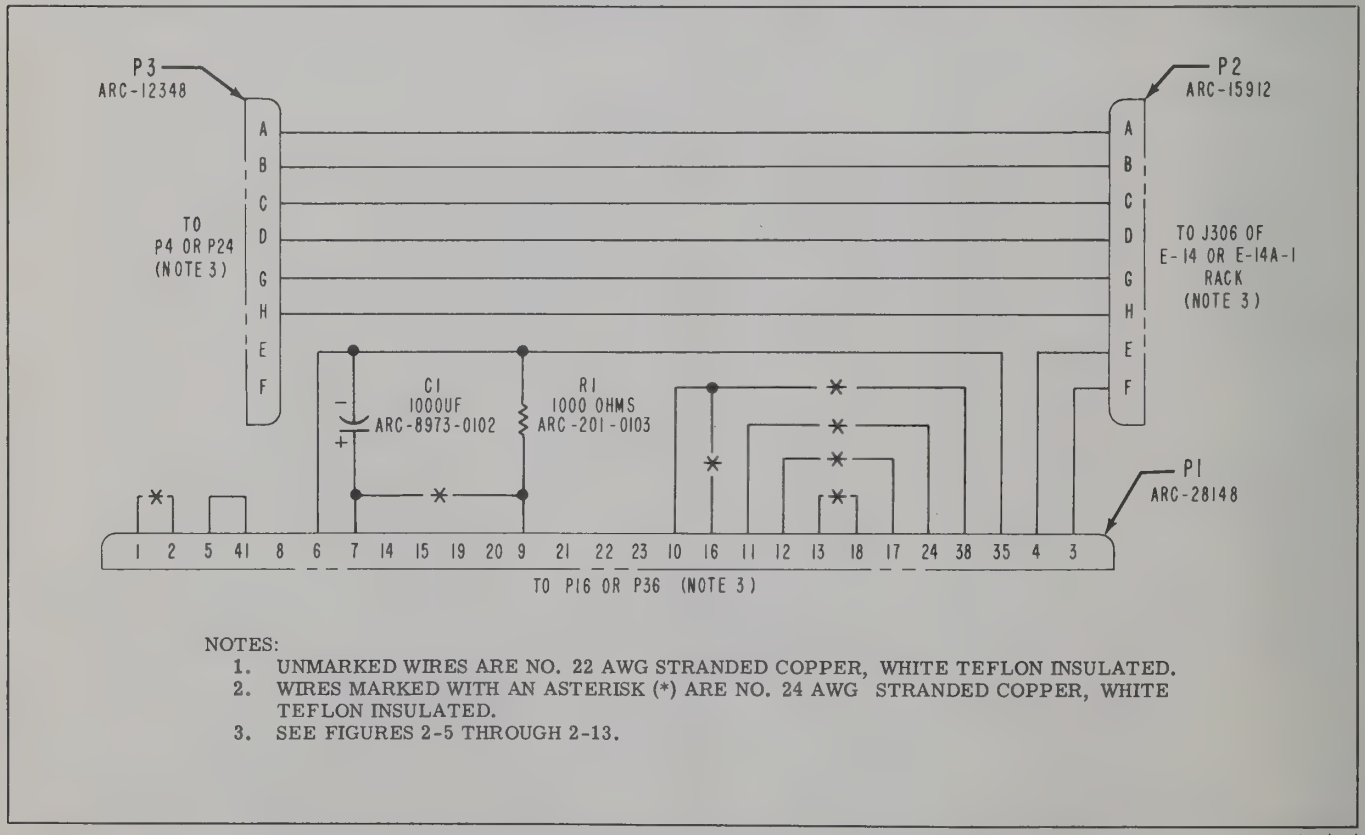
5–3. LUBRICATION.

The mechanical parts of the B-19A should not be lubricated. The parts should be cleaned by removing dust with a soft, dry brush or low-pressure (10 psi) compressed air.

5–4. REMOVAL OF ASSEMBLIES.

Removal of Assemblies A1 through A5. Remove assemblies A1 through A5 (see Figure 5–2) as follows:

Step 1. Release Dzus fastener at rear of B-19A dust cover and slide cover off unit.



NOTES:
1. UNMARKED WIRES ARE NO. 22 AWG STRANDED COPPER, WHITE TEFLON INSULATED.
2. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 24 AWG STRANDED COPPER, WHITE TEFLON INSULATED.
3. SEE FIGURES 2-5 THROUGH 2-13.

28145A(TP)

Figure 5–1. Cable Assembly ARC-28145, Schematic Diagram

TABLE 5–1. TEST EQUIPMENT

Qty	Name	Designation	Characteristics
1	Attenuator	Boonton Radio Type 505-B	500-ohms, 6-db, coaxial type
1	Bench Test Kit	ARC Type BTK-15F	——
1	Cable Assembly	ARC-28145	——
1	Circuit Breaker	——	28-volts, 10 amperes dc
1	Computer Amplifier	ARC Type CA-10A	——
1	Course Director Test Set	ARC Type H-17	——
1	Low-voltage Supply[1]	——	28-volts, 2 amperes dc
1	26-volt, 400-cps Supply[1]	——	26-volts, 400-cps, 1.5 volt-amperes
1	Multimeter	Simpson Model 260	20,000 ohms/volt
1	Radio Magnetic Indicator	ARC Type IN-16A	——
1	Signal Generator	ARC Type H-14A	——
1	Toggle Switch	——	Double-pole, double-throw
1	Vacuum Tube Voltmeter	Ballantine Model 300	
1	VHF Navigation Receiving Equipment	ARC Type 15F VHF Navigation Equipment	——

[1] Required to test units that do not contain heading frequency converter A4 and inverter A5.

Step 2. Remove two screws (one at each end of assembly) that secure assembly to chassis. Insert a screwdriver blade through slot at each end of chassis and apply upward force to free assembly.

Note

To remove modulator assembly A1, remove screw securing gearing assembly A6 to modulator A1 as well as screws specified in Step 2.

Removal of Gearing Assembly A6. Remove assembly A6 (see Figure 5–2) as follows:

Step 1. Release Dzus fastener at rear of B-19A dust cover and slide cover off unit.

Step 2. Disconnect plugs A6P1 and A6P2 from their chassis mating pins.

Step 3. Remove two screws securing assembly A6 to printed-circuit board of main assembly A7. Remove screw securing assembly A6 to modulator assembly A1. Remove two screws securing assembly A7 to front panel of B-19A.

Step 4. Carefully lift assembly out of chassis. To replace assembly A6, reverse removal procedure.

5–5. DISASSEMBLY OF GEARING ASSEMBLY A6.

Removal of Motor Generator A6MG1. To remove A6MG1, proceed as follows:

Step 1. Remove three screws (3, Figure 5–3), lockwashers (4), clamps (5), and spacers (6) holding A6MG1 (2) in position. Carefully remove A6MG1 from assembly A6.

Step 2. Cut plastic cable clamps holding wires of connector A6P2 (1) and unsolder A6MG1 wires connected to terminals K, L, M, N, O, V, and X of A6P2.

Step 3. To replace A6MG1, reverse procedure outlined in Steps 1 and 2.

Note

Use tape or cord in place of cable clamps to hold wires of A6P2 together.

Removal of 400-cps Differential Synchro A6B1. To remove A6B1, proceed as follows:

Step 1. Remove two screws (14, Figure 5–3) securing terminals (13) and index wire (12).

Step 2. Remove three screws (21) holding dial (20) to gear assembly (24). Loosen four screws (16) approximately ⅛ inch. Separate plates (15) and (51) until dial (20) slides past shaft of A6B1 (42).

Step 3. Loosen screw (23) in clamp (22) and slide clamp off shaft of A6B1 (42).

Step 4. Remove three screws (43), lockwashers (44), clamps (45), and spacers (46) holding A6B1 (42). Remove A6B1 from assembly A6.

Step 5. Cut plastic cable clamps holding wires of connectors A6P1 (30) and unsolder A6B1 wires connected to terminals F, G, H, I, and J of A6P1.

Step 6. To replace A6B1, reverse procedure outlined in Steps 1 through 5.

Note

Use tape or cord in place of cable clamps to hold wires of A6P1 together.

Step 7. Zero A6B1 as outlined in Table 5–2.

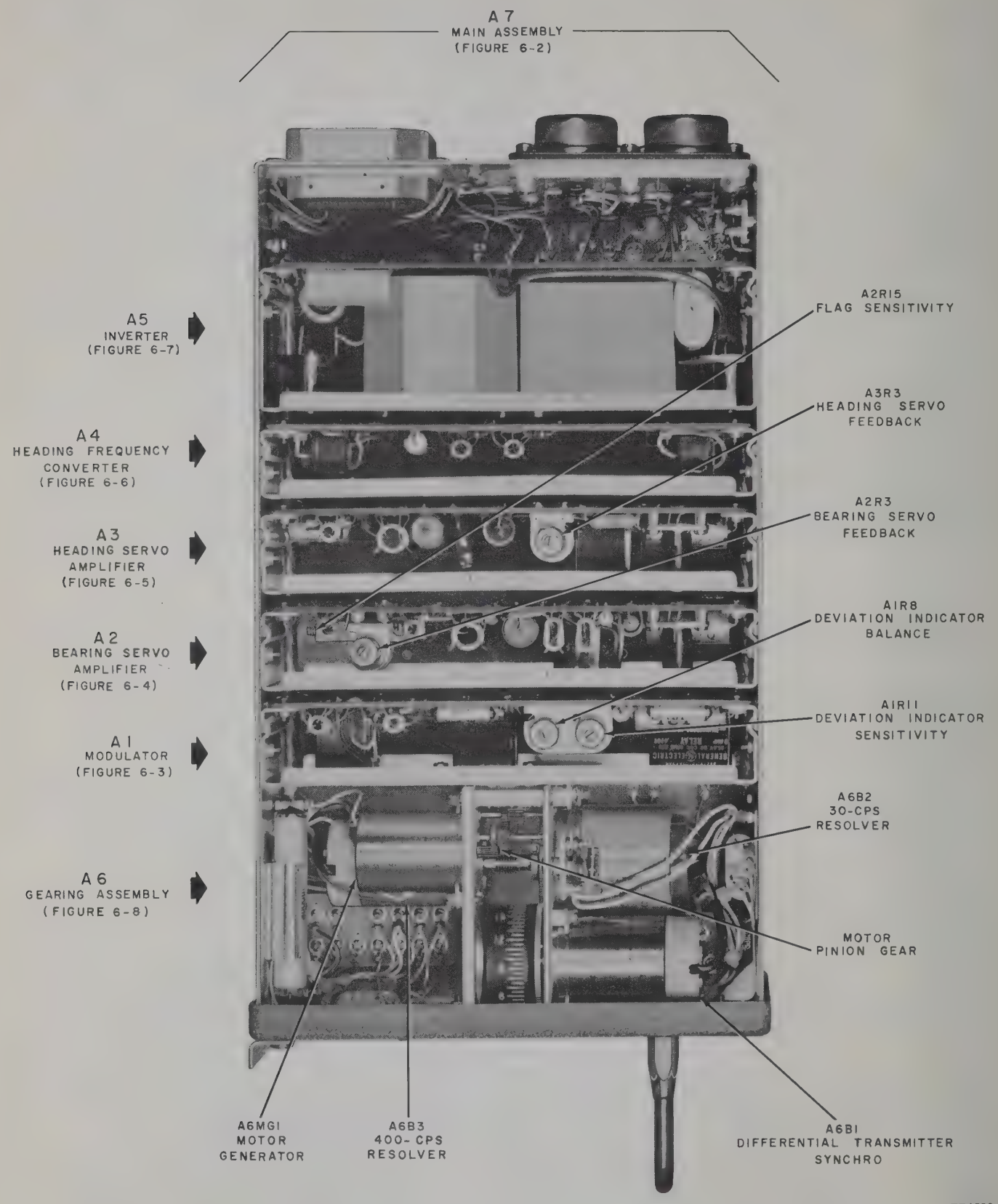


Figure 5–2. B-19A RMI Converter, Assembly Locations and Adjustment Points

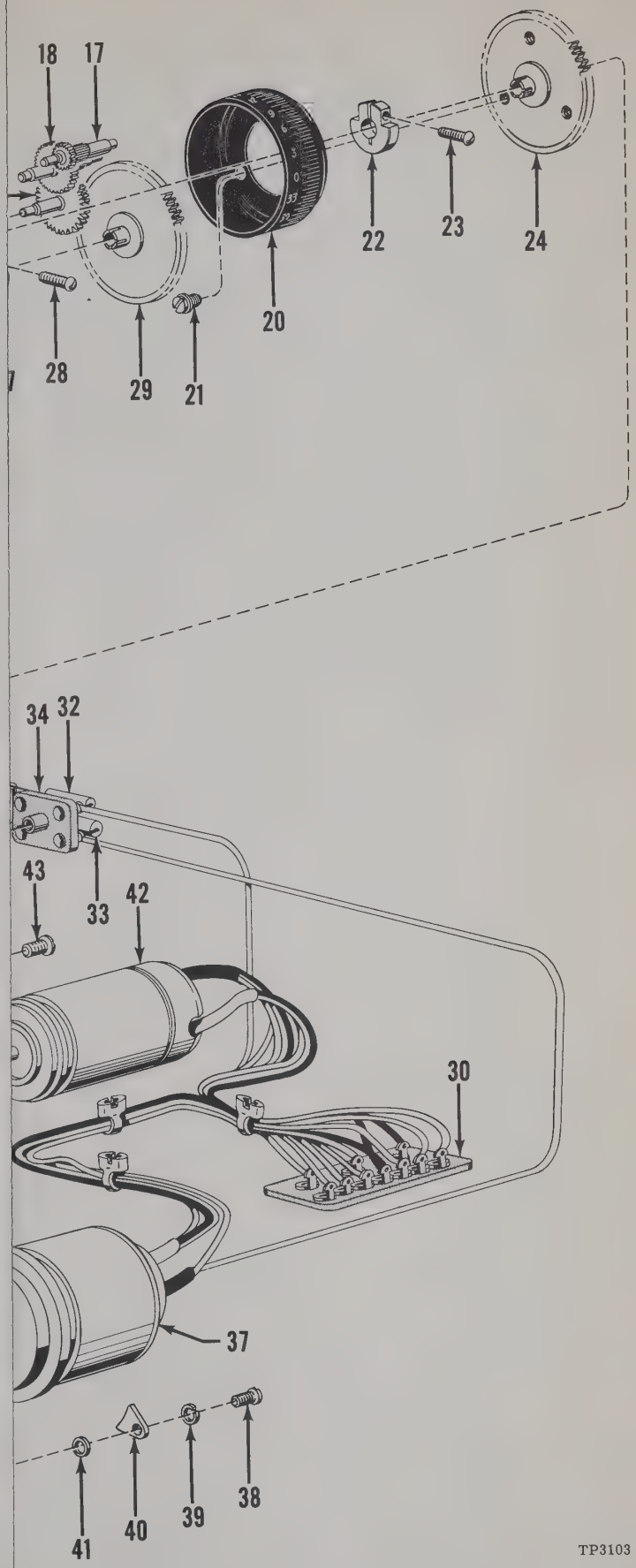


Figure 5–3. Gearing Assembly A6, Exploded View

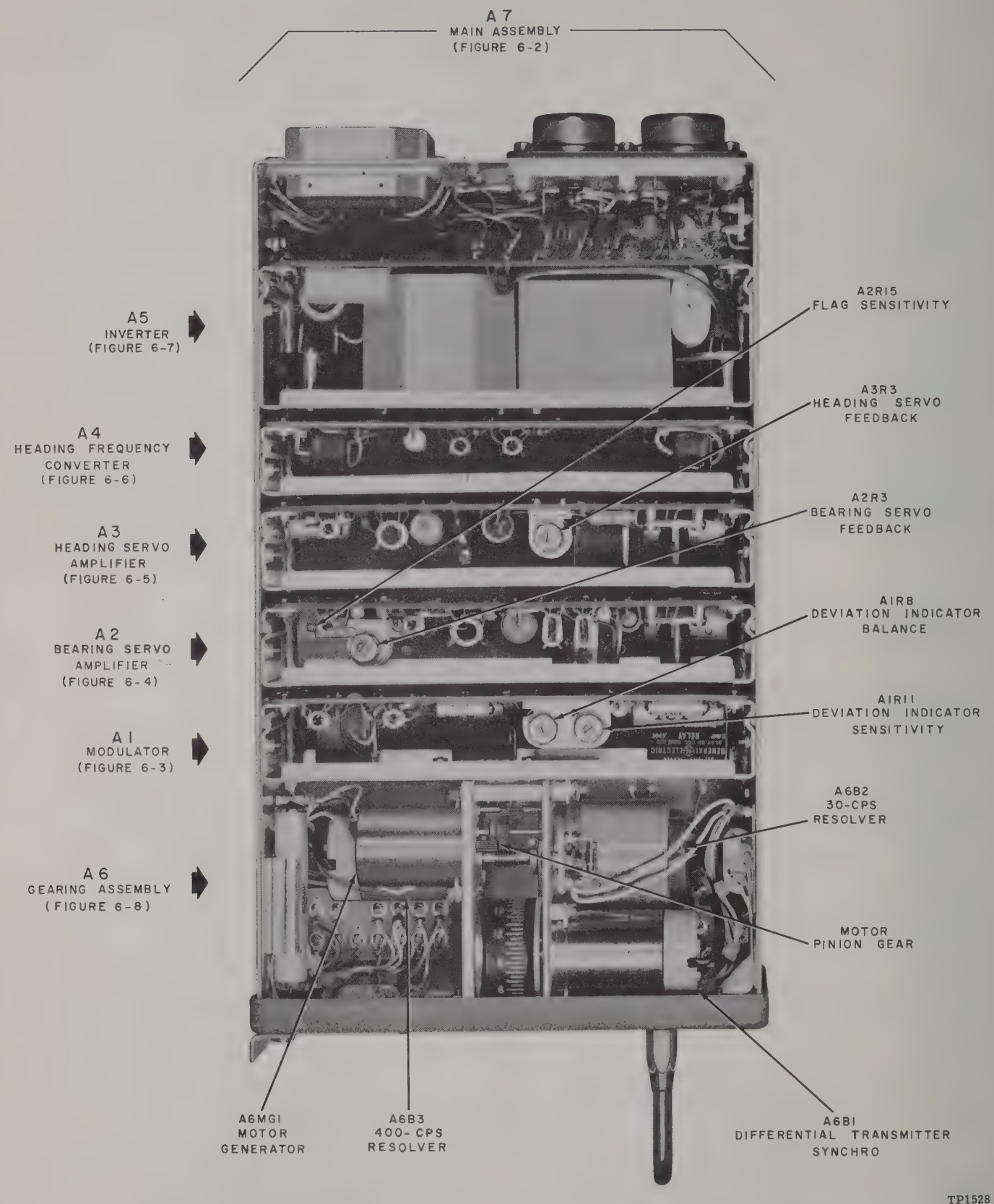
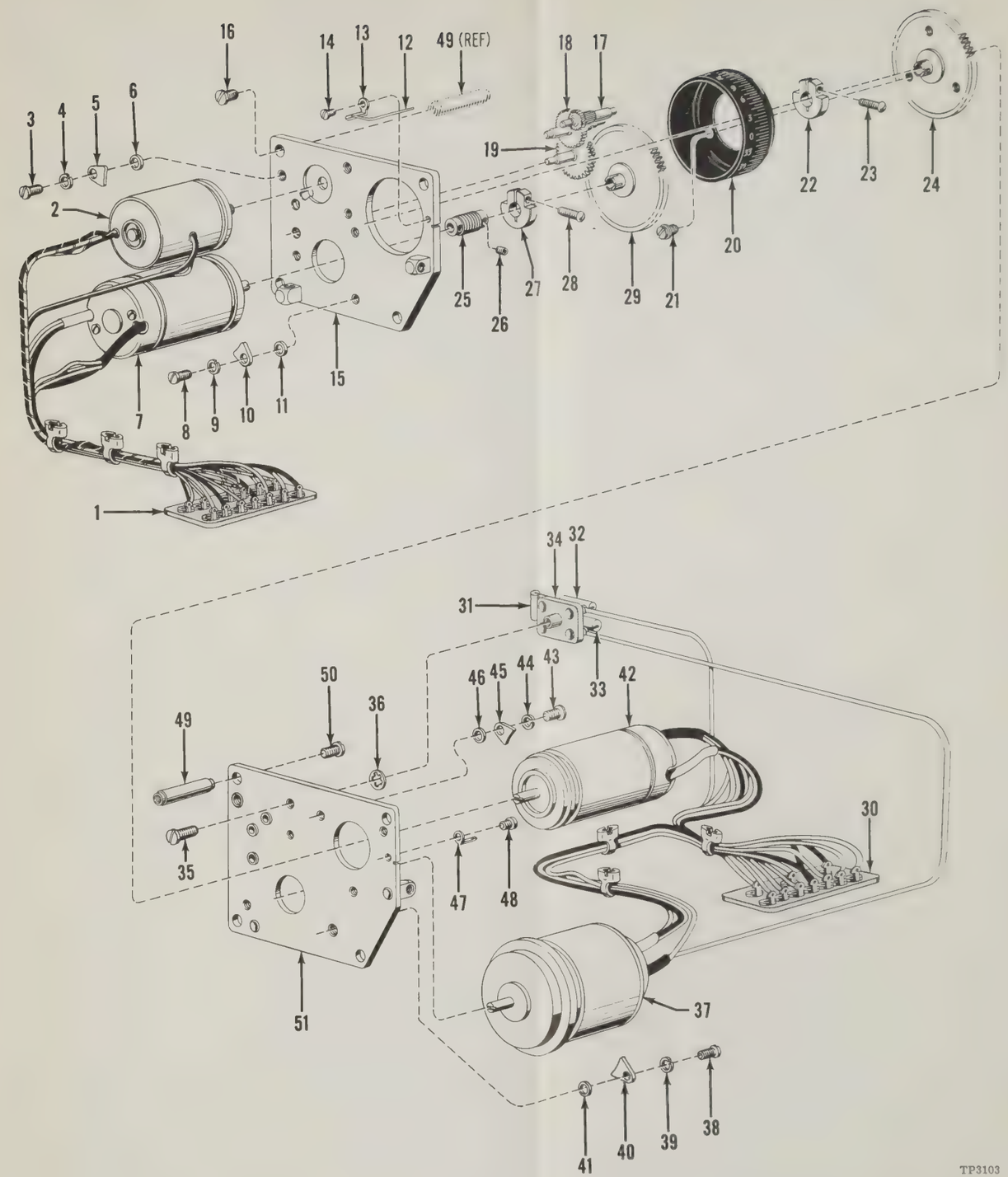


Figure 5–2. B-19A RMI Converter, Assembly Locations and Adjustment Points

Index	Name	Part No.
1	Connector (A6P2)	25416
2	Motor Generator (A6MG1)	26995
3	Screw	163-0020
4	Lockwasher	4559
5	Clamp	26804
6	Spacer	26805-0001
7	Resolver (A6B3)	25437
8	Screw	163-0024
9	Lockwasher	4559
10	Clamp	26804
11	Spacer	26805-0002
12	Index Wire	(No number)
13	Terminal	7475
14	Screw	162-0008
15	Plate	25805
16	Screw	103-0012
17	Gear Assembly	25398
18	Gear Assembly	25404
19	Gear Assembly	25407
20	Dial	25422
21	Screw	502-0008
22	Clamp	25428
23	Screw	121-0020
24	Gear Assembly	25412
25	Coupling	25430
26	Setscrew	302-0004
27	Clamp	25428
28	Screw	121-0020
29	Gear Assembly	25414
30	Connector (A6P1)	25418
31	Resistor	200-0331
32	Resistor	200-0122
33	Resistor	8944-0471
34	Panel Assembly	25421
35	Screw	103-0016
36	Lockwasher	4103
37	Resolver (A6B2)	25479
38	Screw	163-0024
39	Lockwasher	4559
40	Clamp	26804
41	Spacer	26805-0003
42	Synchro (A6B1)	25438
43	Screw	163-0018
44	Lockwasher	4559
45	Clamp	26804
46	Spacer	26805-0002
47	Terminal	7475
48	Screw	162-0006
49	Bushing	25429
50	Screw	103-0012
51	Plate	25804



TP3103

Figure 5–3. Gearing Assembly A6, Exploded View

Removal of Resolver A6B2. To remove A6B2, proceed as follows:

Step 1. Loosen four setscrews (26, Figure 5–3) in flexible coupling (25) and remove coupling.

Step 2. Loosen screw (28) in clamp (27) and slide clamp off shaft of A6B2 (37).

Step 3. Remove three screws (38), lockwashers (39), clamps (40) and spacers (41) holding A6B2 (37). Remove A6B2 from assembly A6.

Step 4. Cut plastic cable clamps holding wires of connector A6P1 (30) and unsolder A6B2 wires connected to terminals A, B, C, D, and E of A6P1. Unsolder white wires connected to terminals of panel assembly (34).

Step 5. To replace A6B2, reverse procedure outlined in Steps 1 through 4.

Note

Use tape or cord in place of cable clamps to hold wires of A6P1 together.

Step 6. Zero A6B2 as outlined in Table 5–2.

Removal of Resolver A6B3. To remove A6B3, proceed as follows:

Step 1. Loosen two setscrews (26, Figure 5–3) in flexible coupling (25).

Step 2. Remove three screws (8), lockwashers (9), clamps (10), and spacers (11) holding A6B3 (7). Remove A6B3 from assembly A6.

Step 3. Cut plastic cable clamps holding wires of connector A6P2 (1) and unsolder A6B3 wires connected to terminals P, R, S, T, U, and W of A6P2.

Step 4. To replace A6B3, reverse procedure outlined in Steps 1 through 3.

Note

Use tape or cord in place of cable clamps to hold wires of A6P2 together.

Step 5. Zero A6B3 as outlined in Table 5–2.

5–6. PERFORMANCE TEST AND ADJUSTMENT PROCEDURES.

Table 5–2 outlines the procedures for testing and adjusting the B-19A. The locations of assemblies and adjustment points are shown in Figure 5–2; the bench test setup required to test and adjust the unit is shown in Figure 5–4.

TABLE 5–2. TEST AND ADJUSTMENT PROCEDURE

Step	Preliminary Action	Normal Indications	Next Step
1	Connect Equipment as shown in Figure 5–4. Set FREQUENCY SELECTOR switch S1 to appropriate position. **CAUTION** Heading frequency converter A4 and inverter A5 must not be installed in B-19A if S1 is set to 400 cps.	None.	Step 2.
2	Apply power to equipment and allow a 10-minute warmup period. During warmup, tune ARC Type R-34A Receiver to 114.9 mc, set course pointer of ARC Type IN-10 Course Indicator to 0, and set ARC Type H-14A Signal Generator controls as follows: a. OMNI TRACK to 0 b. MODULATION to OMNI c. MC to B (114.9 mc) d. ATTENUATOR to 40μv Set ARC Type H-17 Course Director Test Set controls as follows: a. HDG SYN to INT b. 60~ VOLTAGE to NORM c. 60~ to ON	After warmup, B-19A dial reads 0, double-bar pointer of ARC Type IN-16A RMI points to 0, vertical pointer of course indicator is centered, and TO-FROM meter of course indicator reads TO.	If indications are normal, perform Step 3. If any indication is abnormal, perform Steps 4 through 10, and then perform Step 3.

Removal of Resolver A6B2. To remove A6B2, proceed as follows:

Step 1. Loosen four setscrews (26, Figure 5–3) in flexible coupling (25) and remove coupling.

Step 2. Loosen screw (28) in clamp (27) and slide clamp off shaft of A6B2 (37).

Step 3. Remove three screws (38), lockwashers (39), clamps (40) and spacers (41) holding A6B2 (37). Remove A6B2 from assembly A6.

Step 4. Cut plastic cable clamps holding wires of connector A6P1 (30) and unsolder A6B2 wires connected to terminals A, B, C, D, and E of A6P1. Unsolder white wires connected to terminals of panel assembly (34).

Step 5. To replace A6B2, reverse procedure outlined in Steps 1 through 4.

Note

Use tape or cord in place of cable clamps to hold wires of A6P1 together.

Step 6. Zero A6B2 as outlined in Table 5–2.

Removal of Resolver A6B3. To remove A6B3, proceed as follows:

Step 1. Loosen two setscrews (26, Figure 5–3) in flexible coupling (25).

Step 2. Remove three screws (8), lockwashers (9), clamps (10), and spacers (11) holding A6B3 (7). Remove A6B3 from assembly A6.

Step 3. Cut plastic cable clamps holding wires of connector A6P2 (1) and unsolder A6B3 wires connected to terminals P, R, S, T, U, and W of A6P2.

Step 4. To replace A6B3, reverse procedure outlined in Steps 1 through 3.

Note

Use tape or cord in place of cable clamps to hold wires of A6P2 together.

Step 5. Zero A6B3 as outlined in Table 5–2.

5–6. PERFORMANCE TEST AND ADJUSTMENT PROCEDURES.

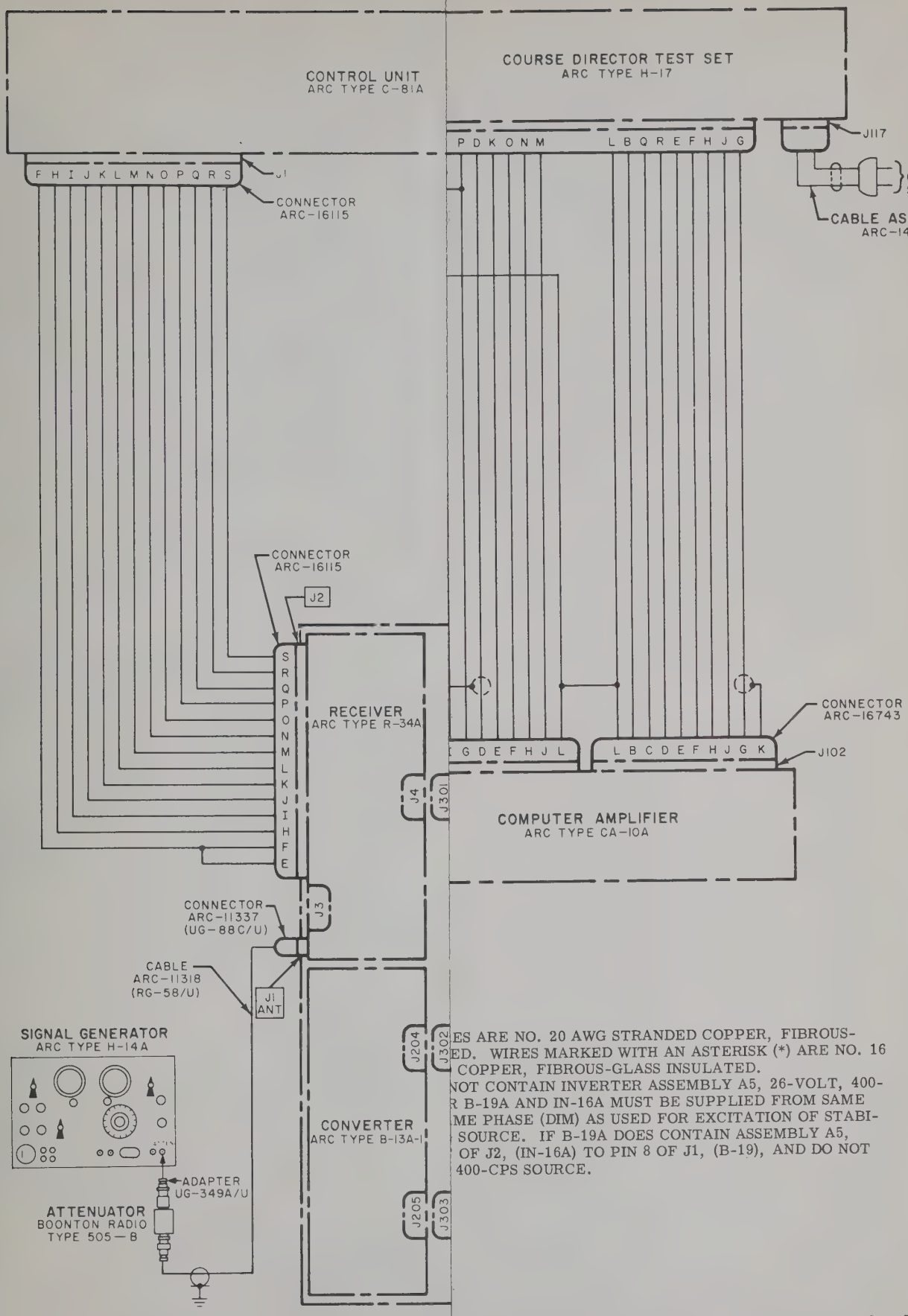
Table 5–2 outlines the procedures for testing and adjusting the B-19A. The locations of assemblies and adjustment points are shown in Figure 5–2; the bench test setup required to test and adjust the unit is shown in Figure 5–4.

TABLE 5–2. TEST AND ADJUSTMENT PROCEDURE

Step	Preliminary Action	Normal Indications	Next Step
1	Connect Equipment as shown in Figure 5–4. Set FREQUENCY SELECTOR switch S1 to appropriate position. **CAUTION** Heading frequency converter A4 and inverter A5 must not be installed in B-19A if S1 is set to 400 cps.	None.	Step 2.
2	Apply power to equipment and allow a 10-minute warmup period. During warmup, tune ARC Type R-34A Receiver to 114.9 mc, set course pointer of ARC Type IN-10 Course Indicator to 0, and set ARC Type H-14A Signal Generator controls as follows: a. OMNI TRACK to 0 b. MODULATION to OMNI c. MC to B (114.9 mc) d. ATTENUATOR to 40μv Set ARC Type H-17 Course Director Test Set controls as follows: a. HDG SYN to INT b. 60~ VOLTAGE to NORM c. 60~ to ON	After warmup, B-19A dial reads 0, double-bar pointer of ARC Type IN-16A RMI points to 0, vertical pointer of course indicator is centered, and TO-FROM meter of course indicator reads TO.	If indications are normal, perform Step 3. If any indication is abnormal, perform Steps 4 through 10, and then perform Step 3.

TABLE 5–2. TEST AND ADJUSTMENT PROCEDURE—Continued

Step	Preliminary Action	Normal Indications	Next Step
3	Switch H-14A OMNI TRACK control quickly to 180.	B-19A dial and RMI double-bar pointer overshoot 180 once and then come to rest at 180.	If normal, perform Step 6 and Steps 9 through 14. If abnormal, perform Steps 4 througl 10 and then repeat this step.
4	Turn B-19A bearing servo feedback control A2R3 (Figure 5–2) full clockwise, then turn counterclockwise until B-19A dial starts hunting.	B-19A dial and RMI double-bar pointer hunt about the rest position (180).	Step 5.
5	Alternately set H-14A OMNI TRACK switch to 0 and 180, changing setting rapidly each time. Adjust A2R3 for normal indications.	B-19A dial and RMI double-bar pointer move to appropriate position and overshoot once before coming to rest for each operation of the OMNI TRACK switch.	If normal, perform Step 6 and Steps 9 through 14. If abnormal, perform Steps 6, 7, and 8.
6	Carefully remove gearing assembly A6 (paragraph 5–4) leaving A6P1 and A6P2 connected to main assembly A7. **CAUTION** Be careful when removing A6 or when making adjustments to avoid breaking leads of A6P1 and A6P2.	None.	Step 7.
7	Set H-14A OMNI TRACK switch to 0. Loosen clamps on 30-cps resolver A6B2 and turn body of resolver until B-19A dial reads 0. Tighten resolver clamps.	B-19A dial reads 0.	If normal, perform Step 8. If abnormal, check B-19A bearing servo amplifier A2, flag relay A7K1, and gearing assembly A6, and then repeat this step.
8	Unclamp and rotate body of 400-cps differential synchro A6B1 until normal indication is obtained.	RMI double-bar pointer points to 0.	If normal, perform Step 9. If abnormal, check A6B1 and then repeat this step.
9	Connect a jumper between terminals T and W of A6P2. Adjust deviation indicator balance control A1R8 of B-19A to center vertical pointer of course indicator. Remove jumper and check vertical pointer and TO-FROM meter of course indicator.	Vertical pointer is centered, and TO-FROM meter reads TO.	If normal, perform Step 11. If abnormal, perform Step 10.
10	Unclamp and rotate body of 400-cps resolver A6B3 until normal vertical pointer indications are obtained.	Vertical pointer is centered, and TO-FROM indicator reads TO.	If normal, perform Step 11. If abnormal, check A6B3 and deviation and to-from phase sensitive detector circuits of modulator A1.
11	Set course selector dial to 10. Adjust deviation indicator sensitivity control A1R11 of B-19A for normal vertical pointer indication.	Vertical pointer is within ½ dot of the last right-hand dot (150-μa meter current).	If normal, perform Step 12. If abnormal, check deviation phase sensitive detector circuits of modulator A1.



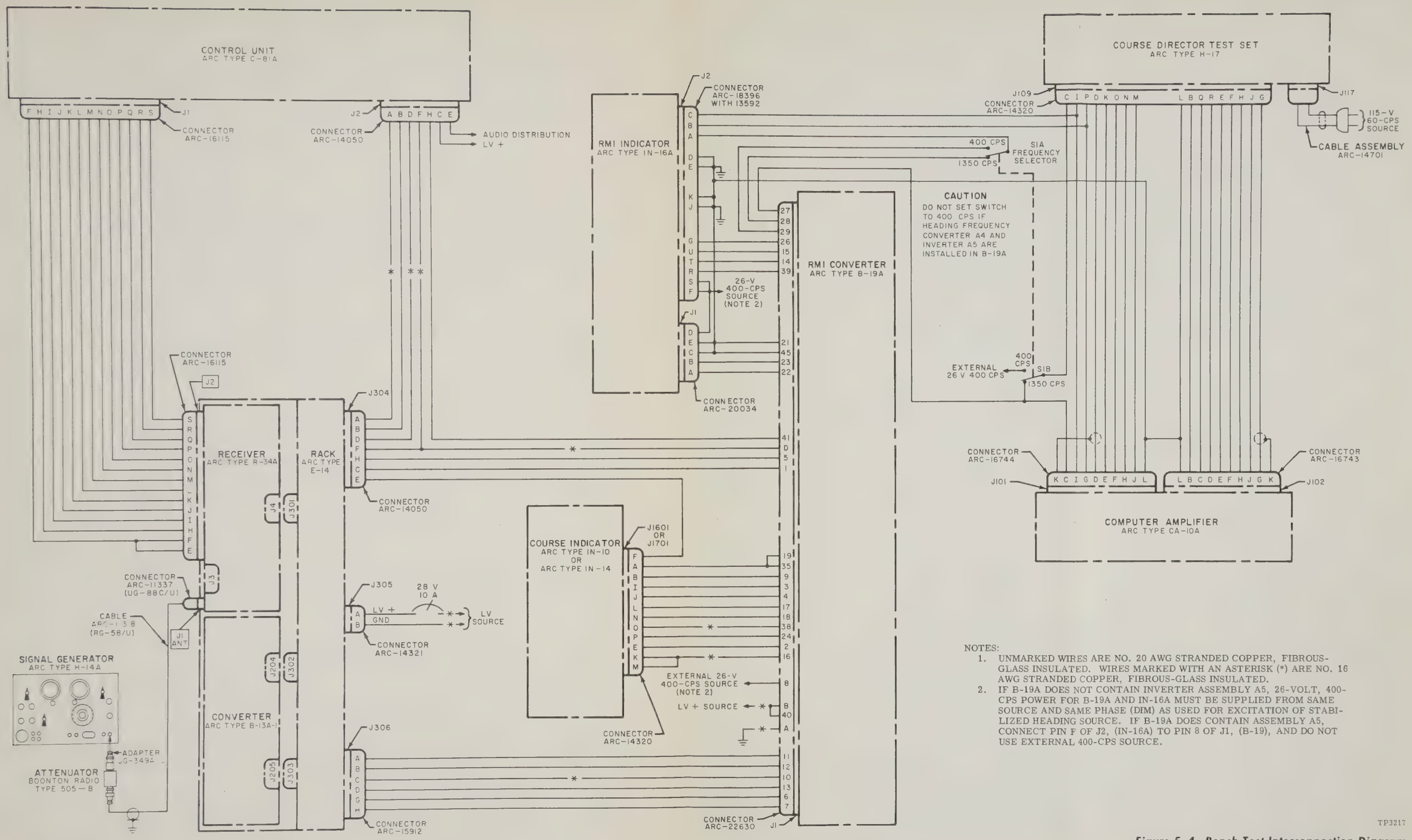
ES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-
ED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16
COPPER, FIBROUS-GLASS INSULATED.
NOT CONTAIN INVERTER ASSEMBLY A5, 26-VOLT, 400-
R B-19A AND IN-16A MUST BE SUPPLIED FROM SAME
ME PHASE (DIM) AS USED FOR EXCITATION OF STABI-
SOURCE. IF B-19A DOES CONTAIN ASSEMBLY A5,
OF J2, (IN-16A) TO PIN 8 OF J1, (B-19), AND DO NOT
400-CPS SOURCE.

TP3217

Figure 5–4. Bench Test Interconnection Diagram for B-19A RMI Converter

TABLE 5–2. TEST AND ADJUSTMENT PROCEDURE—Continued

Step	Preliminary Action	Normal Indications	Next Step
3	Switch H-14A OMNI TRACK control quickly to 180.	B-19A dial and RMI double-bar pointer overshoot 180 once and then come to rest at 180.	If normal, perform Step 6 and Steps 9 through 14. If abnormal, perform Steps 4 through 10 and then repeat this step.
4	Turn B-19A bearing servo feedback control A2R3 (Figure 5–2) full clockwise, then turn counterclockwise until B-19A dial starts hunting.	B-19A dial and RMI double-bar pointer hunt about the rest position (180).	Step 5.
5	Alternately set H-14A OMNI TRACK switch to 0 and 180, changing setting rapidly each time. Adjust A2R3 for normal indications.	B-19A dial and RMI double-bar pointer move to appropriate position and overshoot once before coming to rest for each operation of the OMNI TRACK switch.	If normal, perform Step 6 and Steps 9 through 14. If abnormal, perform Steps 6, 7, and 8.
6	Carefully remove gearing assembly A6 (paragraph 5–4) leaving A6P1 and A6P2 connected to main assembly A7. **CAUTION** Be careful when removing A6 or when making adjustments to avoid breaking leads of A6P1 and A6P2.	None.	Step 7.
7	Set H-14A OMNI TRACK switch to 0. Loosen clamps on 30-cps resolver A6B2 and turn body of resolver until B-19A dial reads 0. Tighten resolver clamps.	B-19A dial reads 0.	If normal, perform Step 8. If abnormal, check B-19A bearing servo amplifier A2, flag relay A7K1, and gearing assembly A6, and then repeat this step.
8	Unclamp and rotate body of 400-cps differential synchro A6B1 until normal indication is obtained.	RMI double-bar pointer points to 0.	If normal, perform Step 9. If abnormal, check A6B1 and then repeat this step.
9	Connect a jumper between terminals T and W of A6P2. Adjust deviation indicator balance control A1R8 of B-19A to center vertical pointer of course indicator. Remove jumper and check vertical pointer and TO-FROM meter of course indicator.	Vertical pointer is centered, and TO-FROM meter reads TO.	If normal, perform Step 11. If abnormal, perform Step 10.
10	Unclamp and rotate body of 400-cps resolver A6B3 until normal vertical pointer indications are obtained.	Vertical pointer is centered, and TO-FROM indicator reads TO.	If normal, perform Step 11. If abnormal, check A6B3 and deviation and to-from phase sensitive detector circuits of modulator A1.
11	Set course selector dial to 10. Adjust deviation indicator sensitivity control A1R11 of B-19A for normal vertical pointer indication.	Vertical pointer is within ½ dot of the last right-hand dot (150-μa meter current).	If normal, perform Step 12. If abnormal, check deviation phase sensitive detector circuits of modulator A1.



NOTES:

1. UNMARKED WIRES ARE NO. 20 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 16 AWG STRANDED COPPER, FIBROUS-GLASS INSULATED.
2. IF B-19A DOES NOT CONTAIN INVERTER ASSEMBLY A5, 26-VOLT, 400-CPS POWER FOR B-19A AND IN-16A MUST BE SUPPLIED FROM SAME SOURCE AND SAME PHASE (DIM) AS USED FOR EXCITATION OF STABILIZED HEADING SOURCE. IF B-19A DOES CONTAIN ASSEMBLY A5, CONNECT PIN F OF J2, (IN-16A) TO PIN 8 OF J1, (B-19), AND DO NOT USE EXTERNAL 400-CPS SOURCE.

TP3217

Figure 5–4. Bench Test Interconnection Diagram for B-19A RMI Converter

TABLE 5–2. TEST AND ADJUSTMENT PROCEDURE—Continued

Step	Preliminary Action	Normal Indications	Next Step
12	Set course selector dial to 0. Rotate motor pinion gear (Figure 5–1) slowly until vertical pointer is midway between last two dots (135-μa meter current) on either right- or left-hand side of course indicator. Adjust flag sensitivity control A2R15 (accessible through hole in bottom of chassis) to obtain a warning flag indication on course indicator.	Warning flag should not appear before the vertical pointer is over third dot (90-μa meter current); flag must be showing when vertical pointer is over last dot.	If normal, perform Step 13. If abnormal, check flag control circuits of bearing servo amplifier A2, and check relay A7K1.
13	Turn B-19A heading servo feedback control A3R3 full clockwise. Quickly change setting of simulated gyro in ARC Type H-17 Course Director Test Set while turning A3R3 counterclockwise until normal RMI heading card indications are obtained.	RMI heading card moves to appropriate position and overshoots once before coming to rest for each operation of H-17 simulated gyro.	If normal, perform Step 14. If abnormal, check B-19A heading servo amplifier A3 and, if used, heading frequency converter A4.
14	Set H-17 simulated gyro to zero and check RMI heading card for "runout" errors by advancing simulated gyro in 30-degree steps.	RMI heading card should agree with simulated gyro settings ($\pm$2 degrees).	If abnormal, check B-19A heading servo amplifier A3 and, if used, heading frequency converter A4.

5–7. TROUBLE ANALYSIS.

General. The isolation of trouble requires a systematic method of localizing the trouble, first to the stage in which the trouble exists and then to the defective part or parts within the stage. Trouble-shooting, based on the use of voltage measurements, will help to determine which stage is at fault and which part within the stage is producing the trouble (refer to paragraph 5–8). Circuit trouble-shooting based on the use of resistance measurements is not recommended since transistors will produce wide variations in the resistance of circuits that are operating properly. However, resistance tests of individual parts may be made if the transistors are removed from the circuit containing the part.

Trouble-shooting Chart. Table 5–3 lists the symptoms of some possible troubles, their probable causes, and the analysis procedures that should be used to verify each probable cause. To assist further in localizing troubles, refer to the principles of operation discussion in Section IV and the schematic diagram in Section VI.

Note

When using the trouble-shooting table, the items listed in the Probable Cause column for a particular symptom should be investigated in the order given.

TABLE 5–3. TROUBLE-SHOOTING CHART

Symptom	Probable Cause	Analysis Procedure
TO-FROM meter and vertical pointer of course indicator inoperative; RMI indications normal.	Relay A7K2 defective.	Check voltage on contacts F and D of A7K2. There should be 26 volts ac on both contacts. If abnormal, remove lead connected to terminal F and check for continuity between terminals F and D. If continuity exists, check modulator transformer A1T1; if no continuity exists, replace A7K2.
	Rotor of course selector, or resolver A6B3 open.	Remove 400-cps power from entire system. Check resistance of course-selector rotor. Resistance should be approximately 3000 ohms. If normal, check resistance of A6B3 rotor. Resistance should be approximately 4000 ohms.

TABLE 5–3. TROUBLE-SHOOTING CHART—Continued

Symptom	Probable Cause	Analysis Procedure
Vertical pointer of course indicator and VOR pointer of RMI are unsteady.	Bearing servo amplifier A2 defective.	Adjust flag sensitivity control A2R15 (Table 5–2). If adjustment does not correct trouble, check voltages on pin of A2Q6 and A2Q7 (Table 5–4). If abnormal, check transistors and associated components.
Indications presented by vertical pointer and TO-FROM meter of course indicator are incorrect.	Resolver A6B2 improperly adjusted or defective.	Zero A6B2 as outlined in Table 5–2. If adjustment does not correct trouble, check A6B2 and, if necessary, check 400-cps chopper (Q1 and Q2) in modulator assembly A1 and amplifier stages (Q1 through Q5) in bearing servo amplifier A2.
Indications presented by VOR pointer of RMI are incorrect.	Synchro A6B1 improperly adjusted or defective.	Zero, A6B1, as outlined in Table 5–2. If adjustment does not correct trouble, check A6B2.
RMI heading card is unstable.	Heading servo feedback control A3R3 improperly adjusted.	Adjust A3R3 as outlined in Table 5–2. If adjustment does not correct trouble, check heading servo amplifier A3 and heading frequency converter A4.
RMI heading card is inoperative.	Heading servo amplifier A3 or heading frequency converter A4 defective.	Measure voltages at pins of all transistors to localize the trouble (Table 5–4).

5–8. VOLTAGE AND RESISTANCE MEASUREMENTS.

Typical voltage measurements for the transistorized circuits of the B-19A are listed in Table 5–4; the voltage test points for each assembly are shown in Figures 6–3 through 6–7. Typical resistance measurements for the gearing assembly are listed in Table 5–5. All measurements were made under the conditions noted in the appropriate table.

TABLE 5–4. VOLTAGE MEASUREMENTS

Conditions:

1. A-c and d-c voltages are approximate (±20%) and are based on the following conditions:
   (a) Values are with respect to chassis ground.
   (b) 27.5 volts dc applied to pin 25 of A7J1.
   (c) 33 volts, 1350 cps applied to pin 27 of A7J1 (applicable to units that contain assemblies A4 and A5).
   (d) 26 volts, 400 cps applied to pin 8 of A7J1 (applicable to units that do not contain assemblies A4 and A5.
2. D-c voltages obtained using a 20,000 ohms-per-volt voltmeter and are positive unless otherwise noted.
3. A-c voltages obtained using a Ballantine Model 300 Voltmeter, or equivalent.
4. A-c and d-c voltages obtained with unit installed in aircraft using appropriate extension cables or on service bench using the test setup shown in Figure 5–4.

Transistor	Test Point	Specific Conditions	V DC	V AC
		MODULATOR A1 (See Figure 6–3)		
Q1	B	VOR converter output zero.	0 to 1.3	0.03
	E		0.5	1.5
	C		0 to 0.1	0.03
Q2	B	VOR converter output zero.	1.0	1.4
	E		0	0
	C		0 to 0.1	0.06

TABLE 5–4. VOLTAGE MEASUREMENTS—Continued

Transistor	Test Point	Specific Conditions	V DC	V AC
		BEARING SERVO AMPLIFIER A2 (See Figure 6–4)		
Q1	B	VOR converter output zero. Dial	2.5	0.021
	E	of gearing unit A6 stationary.	2.5	0.016
	C		4.5	0.6
Q2	B	VOR converter output zero. Dial	4.5	0.6
	E	of gearing unit A6 stationary.	5.0	0.12
	C		14.5	2.6
Q3	B	VOR converter output zero. Dial	14.5	2.6
	E	of gearing unit A6 stationary.	12.0	0.125
	C		0.5	5.9
Q4	B	VOR converter output zero. Dial	28.0	2.1
	E	of gearing unit A6 stationary.	27.5	0.9
	C		18.0	12.75
Q5	B	VOR converter output zero. Dial	18.0	14.0
	E	of gearing unit A6 stationary.	18.0	13.0
	C		0	0
Q6	B	Course indicator flag out of sight.	0.2	0.005
	E		0	0
	C		28.0	6.0
Q7	B	Course indicator flag out of sight.	0.2	0.4
	E		0	0
	C		0.2	0.005
		HEADING SERVO AMPLIFIER A3 (See Figure 6–5)		
Q1	B	Heading card rotating in direction	9.5	0.09
	E	that produces maximum voltage.	9.7	0.15
	C		9.5	0.17
Q2	B	Heading card rotating in direction	9.7	0
	E	that produces maximum voltage.	11.0	0.08
	C		0.6	7.5
Q3	B	Heading card rotating in direction	14.0	13.0
	E	that produces maximum voltage.	13.0	11.5
	C		0.6	0.65
Q4	B	Heading card rotating in direction	28.0	2.2
	E	that produces maximum voltage.	28.0	1.0
	C		13.0	11.0
		HEADING FREQUENCY CONVERTER A4 (See Figure 6–6)		
Q1	B	Heading card rotating CW.	0.2	2.0
	E		1.5	0.3
	C		1.0	0.96
Q1	B	Heading card rotating CCW.	2.0	1.0
	E		–1.6	0.3
	C		–0.6	0.9
Q2	B	Heading card rotating CW.	0.2	0.6
	E		0	0
	C		1.0	0.96
Q2	B	Heading card rotating CCW.	1.7	2.3
	E		0	0
	C		–0.6	0.9

TABLE 5–4. VOLTAGE MEASUREMENTS—Continued

Transistor	Test Point	Specific Conditions	V DC	V AC
		INVERTER A5 (See Figure 6–7)		
Q1	B	None.	23	16
	E		21	15
	C		0	0
		MAIN ASSEMBLY A7 (See Figure 6–2)		
Q1	B	None.	27	17
	E		26	16
	C		0	0
Q2	B	None.	27	17
	E		26	16
	C		0	0

TABLE 5–5. RESISTANCE MEASUREMENTS FOR GEARING UNIT ASSEMBLY A6
(Gearing Assembly Removed From Main Assembly A7)

Test Points		Part Under Test	Normal Resistance (ohms)
+ Lead	— Lead		
		MOTOR GENERATOR A6MG1	
A6P2K	A6P2K"O"	Motor control	55
A6P2K	A6 Frame	Motor control	∞
A6P2N	A6P2V	Motor main	55
A6P2N	A6 Frame	Motor main	∞
A6P2L	A6P2X	Generator excitation	50
A6P2L	A6 Frame	Generator excitation	∞
A6P2M	A6P2X	Generator output	4200
A6P2M	A6 Frame	Generator output	∞
		400-CPS DIFFERENTIAL SYNCHRO A6B1	
A6P1F	A6P1H	Stator 2 and stator 1	11
A6P1F	A6 Frame	Stator 2 and stator 1	∞
A6P1G	A6P1H	Stator 2 and stator 3	11
A6P1G	A6 Frame	Stator 2 and stator 3	∞
A6P1J	A6P1H	Rotor 2 and rotor 3	17
A6P1J	A6 Frame	Rotor 2 and rotor 3	∞
A6P1I	A6P1H	Rotor 2 and rotor 1	17
A6P1I	A6 Frame	Rotor 2 and rotor 1	∞
		30-CPS RESOLVER A6B2	
A6P1A	A6P1C	Stator 1 and stator 2	2200
A6P1E	A6 Frame	Stator 1 and stator 2	∞
A6P1D	A6P1B	Rotor	2900
A6P1D	A6 Frame	Rotor	∞
		400-CPS RESOLVER A6B3	
A6P2P	A6P2R	Stator 1 and stator 2	350
A6P2S	A6 Frame	Stator 1 and stator 2	450
A6P2U	A6P2W	Rotor 1 and rotor 2	∞
A6P2T	A6 Frame	Rotor 1 and rotor 2	∞

SECTION VI
DIAGRAMS

Figure 6–1. B-19A RMI Converter, Schematic Diagram

Figure 6–2. Main Assembly A7, Wiring Diagram

Figure 6–3. Modulator A1, Wiring Diagram

Figure 6–4. Bearing Servo Amplifier A2, Wiring Diagram

Figure 6–5. Heading Servo Amplifier A3, Wiring Diagram

Figure 6–6. Heading Frequency Converter A4, Wiring Diagram

Figure 6–7. Inverter A5, Wiring Diagram

Figure 6–8. Gearing Assembly A6, Wiring Diagram

Figure 6–9. IN-16A Radio Magnetic Indicator, Schematic Diagram

Figure 6–10. J-17A Junction Box, Schematic Diagram

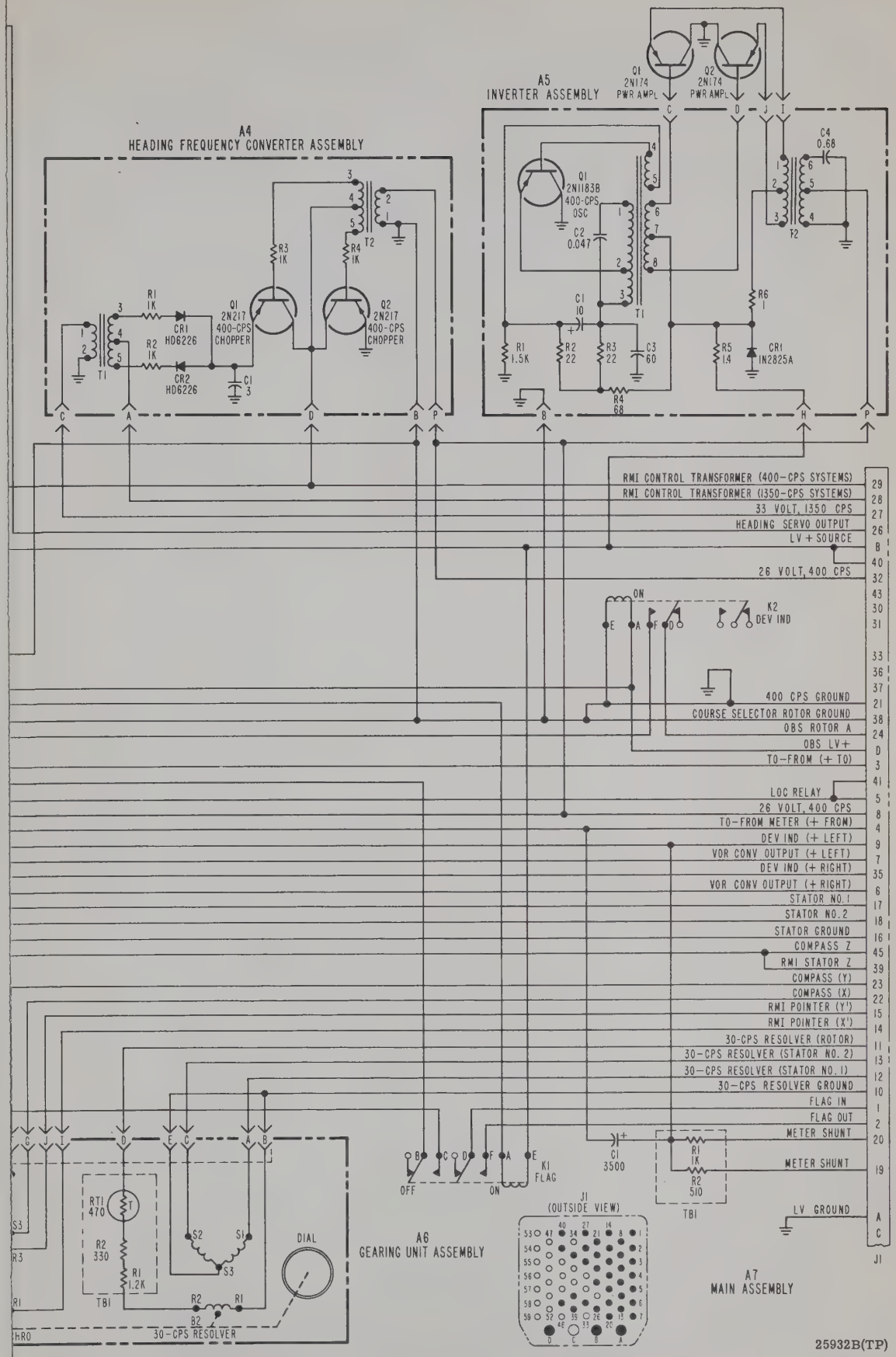
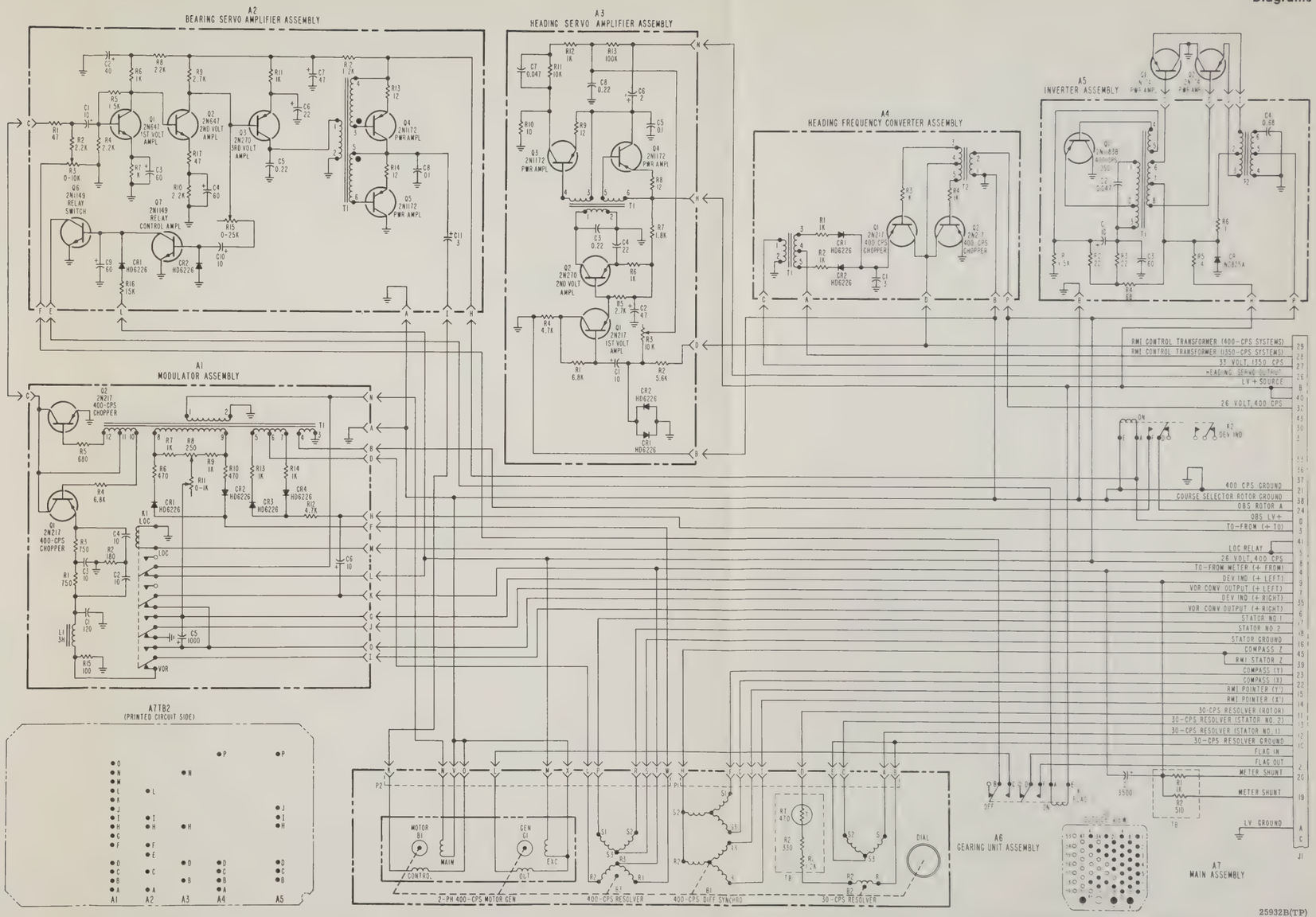


Figure 6–1. B-19A RMI Converter, Schematic Diagram

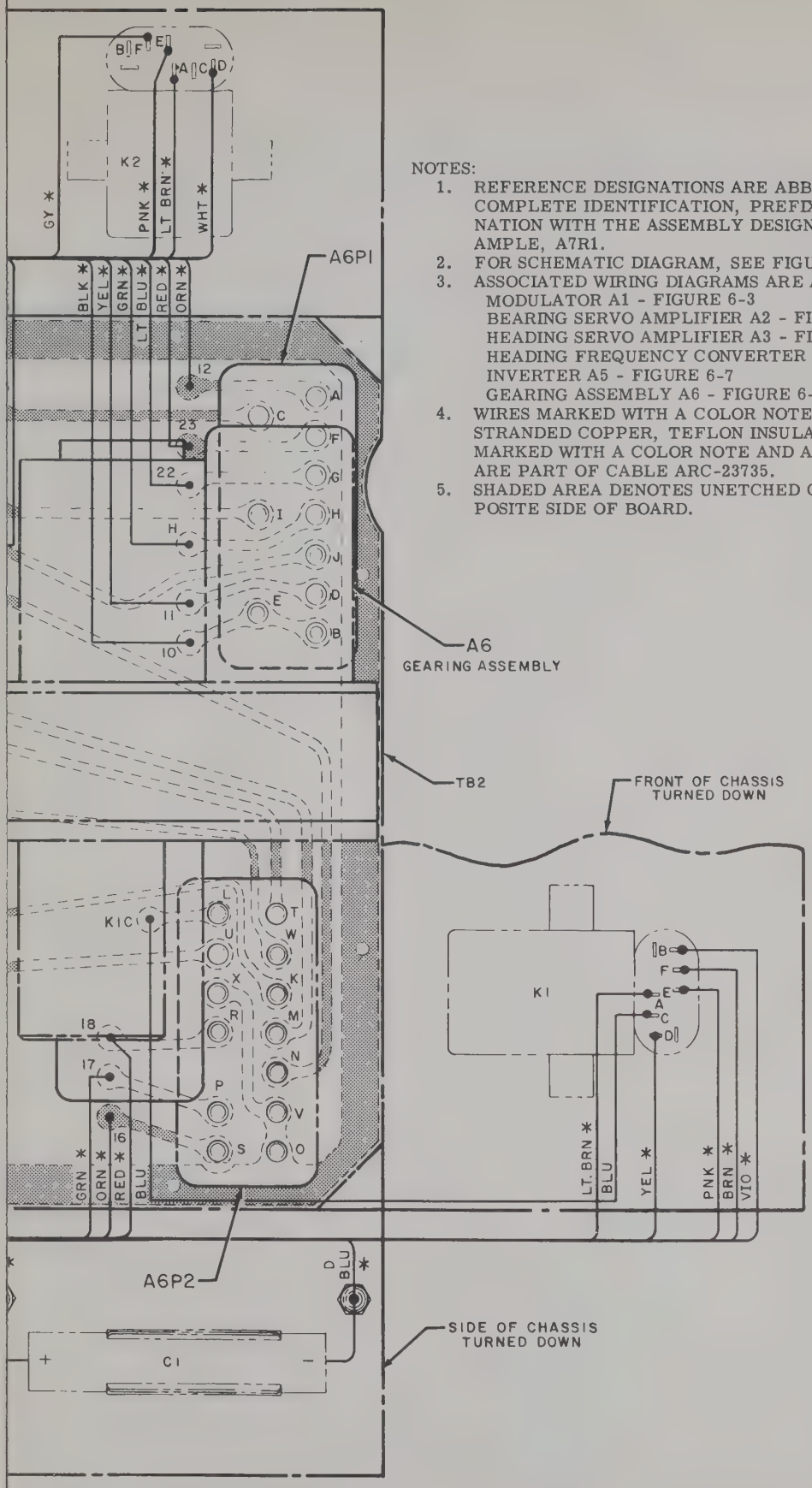
NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION: FOR EXAMPLE, A1C1.
2. FOR MAIN WIRING DIAGRAM, SEE FIGURE 6-2.
3. RESISTOR VALUES ARE IN OHMS. MULTIPLIER K=1000.
4. CAPACITOR VALUES ARE IN MICROFARADS (μF).
5. RELAYS ARE SHOWN UNENERGIZED.



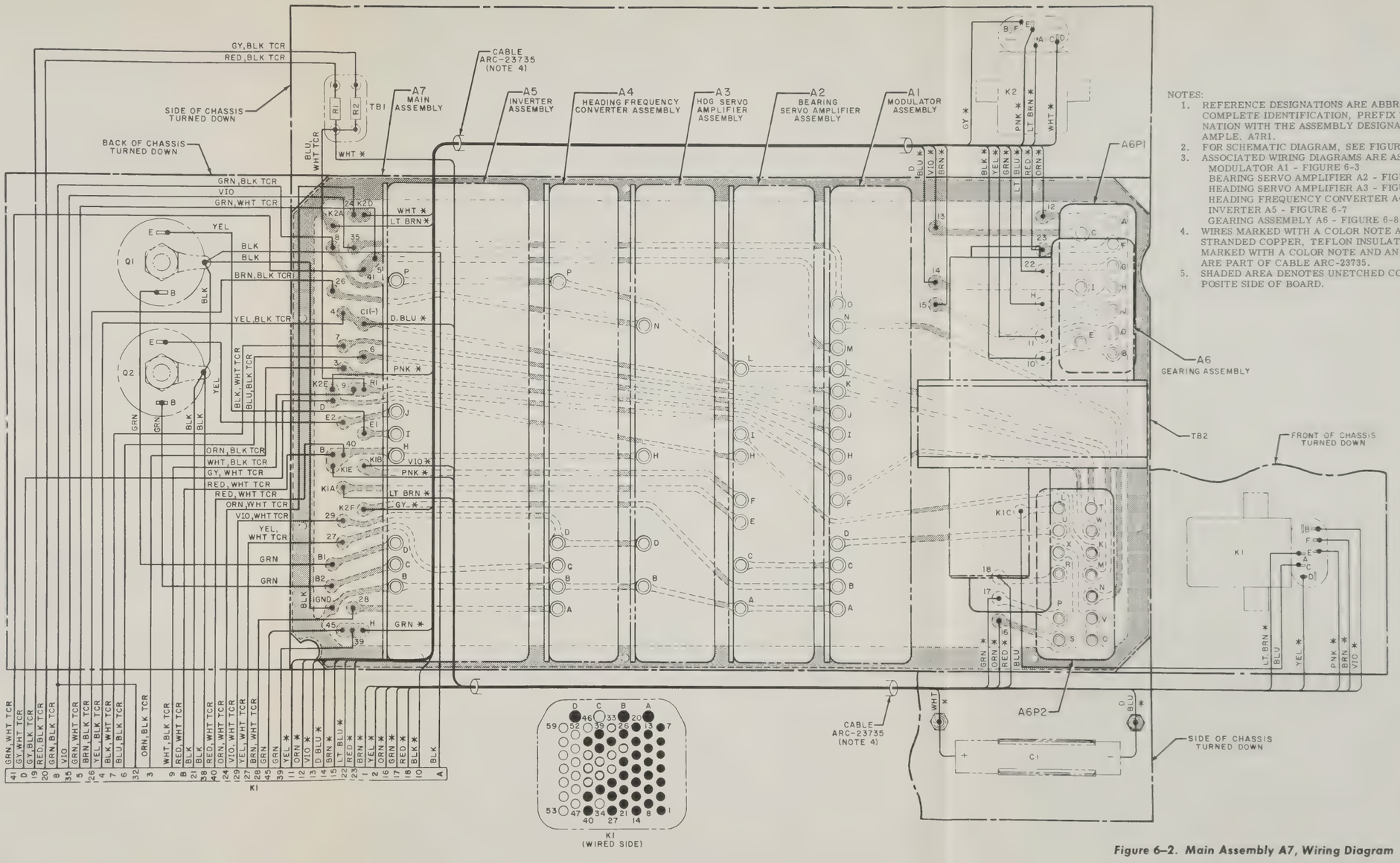
25932B(TP)

Figure 6–1. B-19A RMI Converter, Schematic Diagram


NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A7R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:
MODULATOR A1 - FIGURE 6-3
BEARING SERVO AMPLIFIER A2 - FIGURE 6-4
HEADING SERVO AMPLIFIER A3 - FIGURE 6-5
HEADING FREQUENCY CONVERTER A4 - FIGURE 6-6
INVERTER A5 - FIGURE 6-7
GEARING ASSEMBLY A6 - FIGURE 6-8
4. WIRES MARKED WITH A COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED. WIRES MARKED WITH A COLOR NOTE AND AN ASTERISK (*) ARE PART OF CABLE ARC-23735.
5. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.
A6P1
A6
GEARING ASSEMBLY
TB2
FRONT OF CHASSIS TURNED DOWN
K1
K1C
A6P2
SIDE OF CHASSIS TURNED DOWN
C1
GY *
PNK *
LT BRN *
WHT *
BLK *
YEL *
GRN *
BLU *
RED *
ORN *
LT. BRN *
BLU
YEL *
PNK *
BRN *
VIO *
D BLU *

25931B(TP)

Figure 6–2. Main Assembly A7, Wiring Diagram

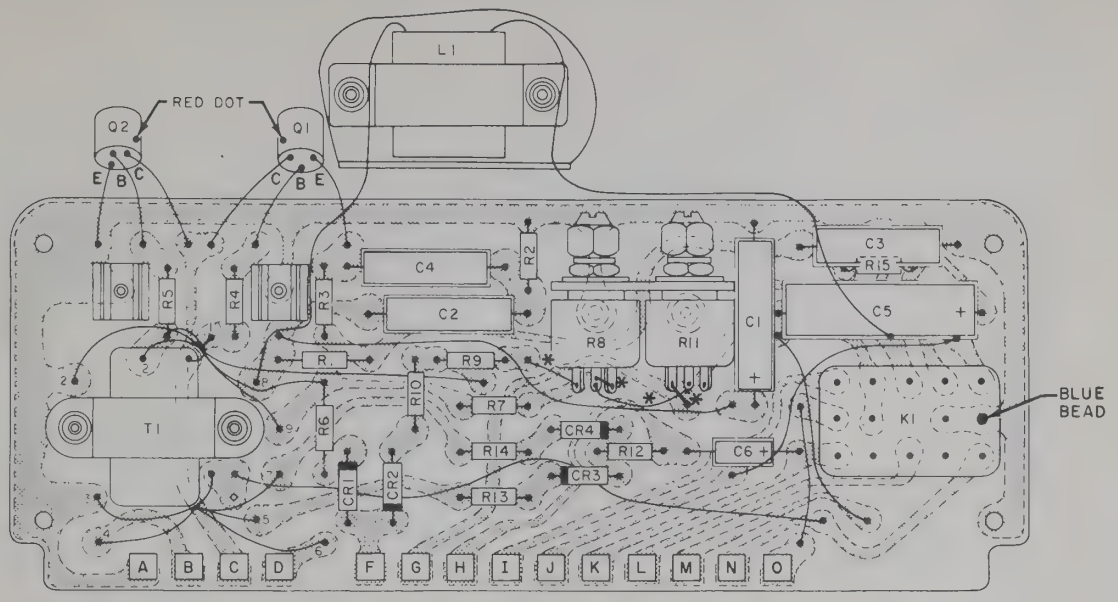


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A7R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. ASSOCIATED WIRING DIAGRAMS ARE AS FOLLOWS:
   MODULATOR A1 - FIGURE 6-3
   BEARING SERVO AMPLIFIER A2 - FIGURE 6-4
   HEADING SERVO AMPLIFIER A3 - FIGURE 6-5
   HEADING FREQUENCY CONVERTER A4 - FIGURE 6-6
   INVERTER A5 - FIGURE 6-7
   GEARING ASSEMBLY A6 - FIGURE 6-8
4. WIRES MARKED WITH A COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED. WIRES MARKED WITH A COLOR NOTE AND AN ASTERISK (*) ARE PART OF CABLE ARC-23735.
5. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

25931B(TP)

Figure 6–2. Main Assembly A7, Wiring Diagram

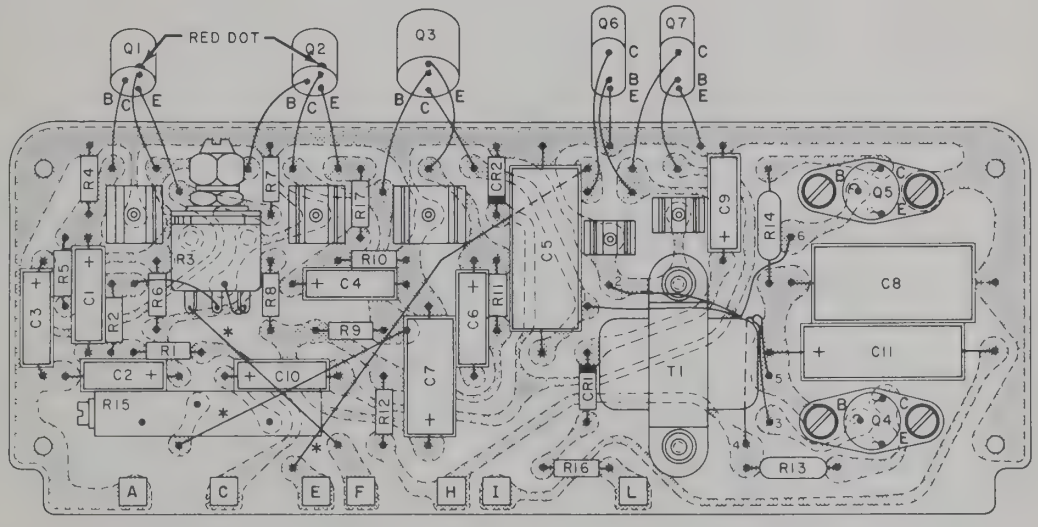


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A1R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. WIRES MARKED WITH AN ASTERISK (*) ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
4. UNMARKED WIRES ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
5. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

25583B(TP)

Figure 6–3. Modulator A1, Wiring Diagram

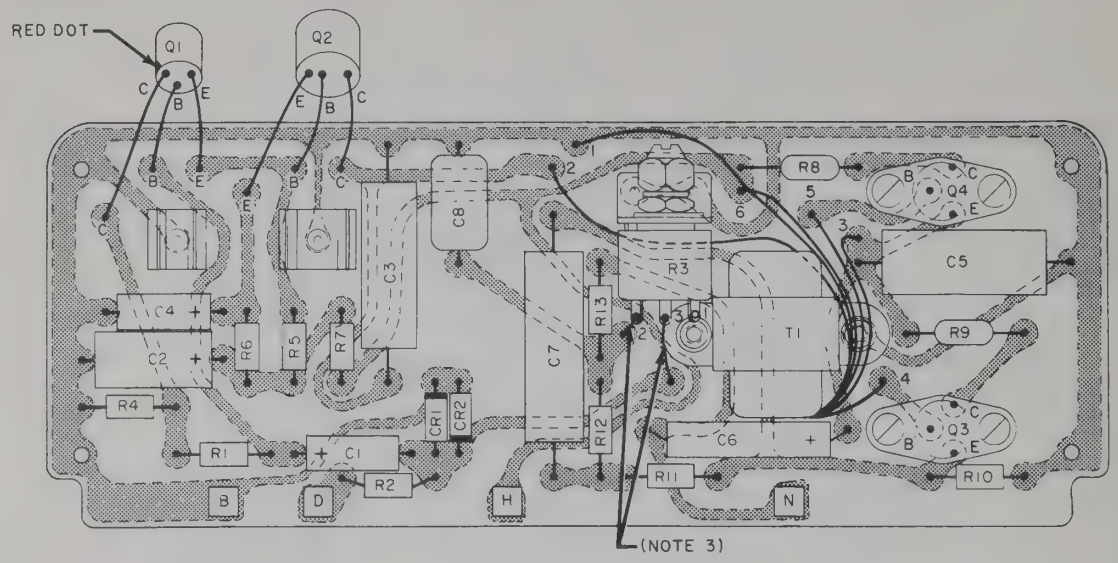


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A2R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
4. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

25590B(TP)

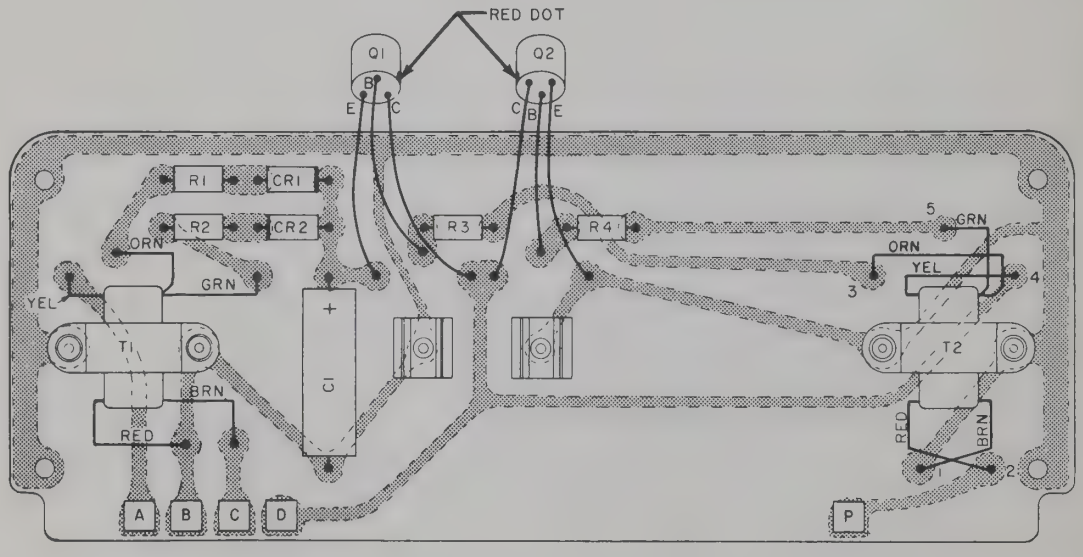
Figure 6–4. Bearing Servo Amplifier A2, Wiring Diagram



NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A3R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. UNMARKED WIRES ARE NO. 24 AWG BARE, SOLID, TINNED COPPER.
4. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

27145D(TP)

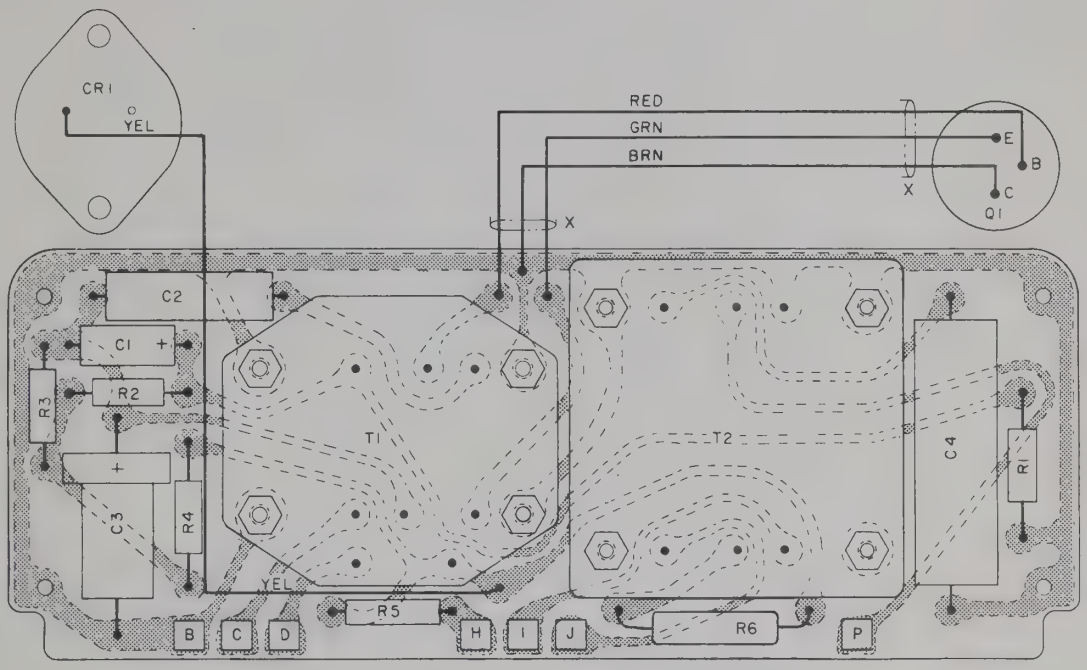
Figure 6–5. Heading Servo Amplifier A3, Wiring Diagram



NOTES:
1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A4R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

27146B(TP)

Figure 6–6. Heading Frequency Converter A4, Wiring Diagram

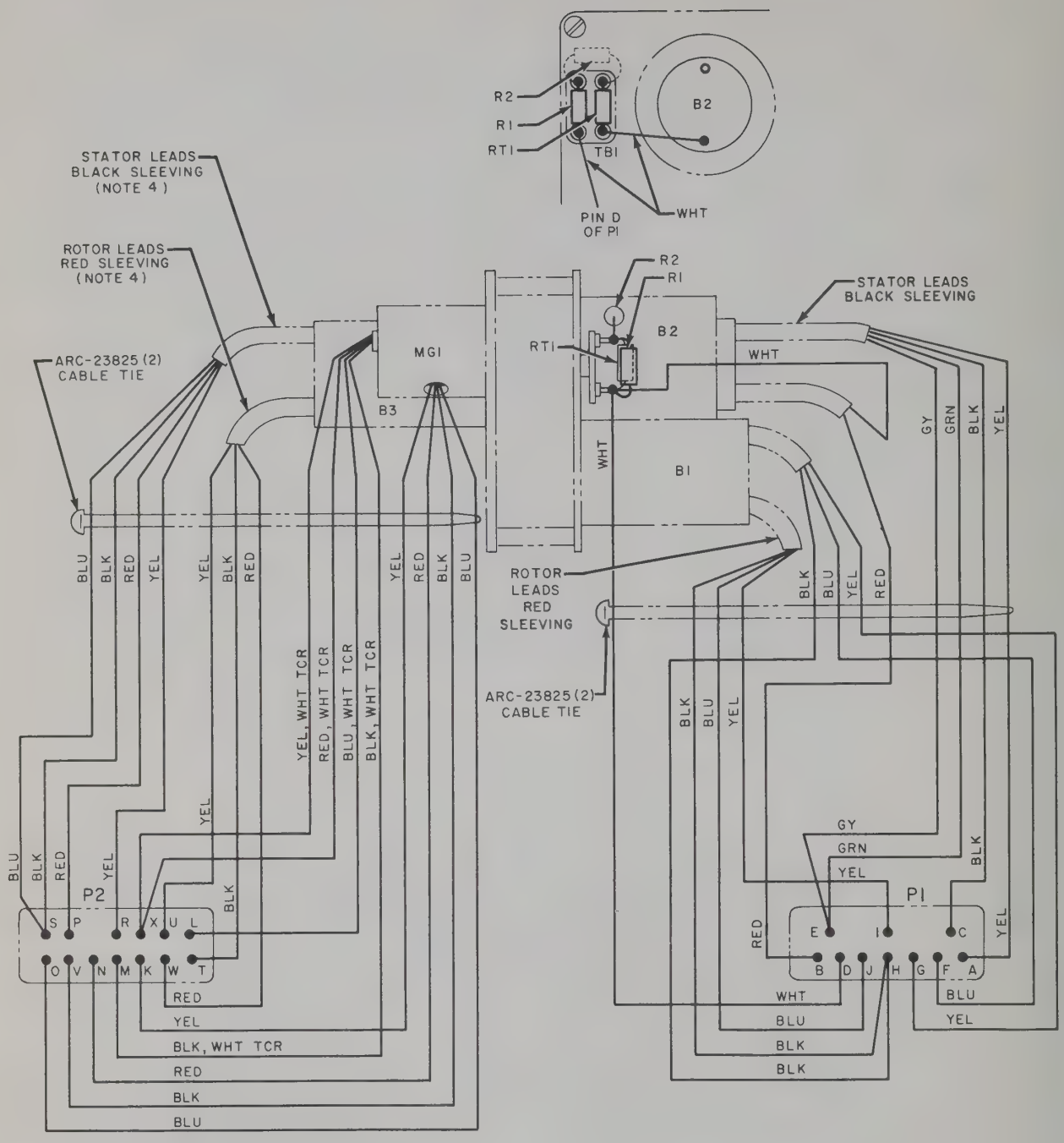


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A5R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. WIRES MARKED WITH A COLOR NOTE ARE NO. 24 AWG STRANDED COPPER, TEFLON INSULATED.
4. TRANSPARENT VINYLITE TUBING (.091 IN. I.D.) INSTALLED OVER WIRES MARKED "X."
5. SHADED AREA DENOTES UNETCHED COPPER ON OPPOSITE SIDE OF BOARD.

27147E(TP)

Figure 6–7. Inverter A5, Wiring Diagram

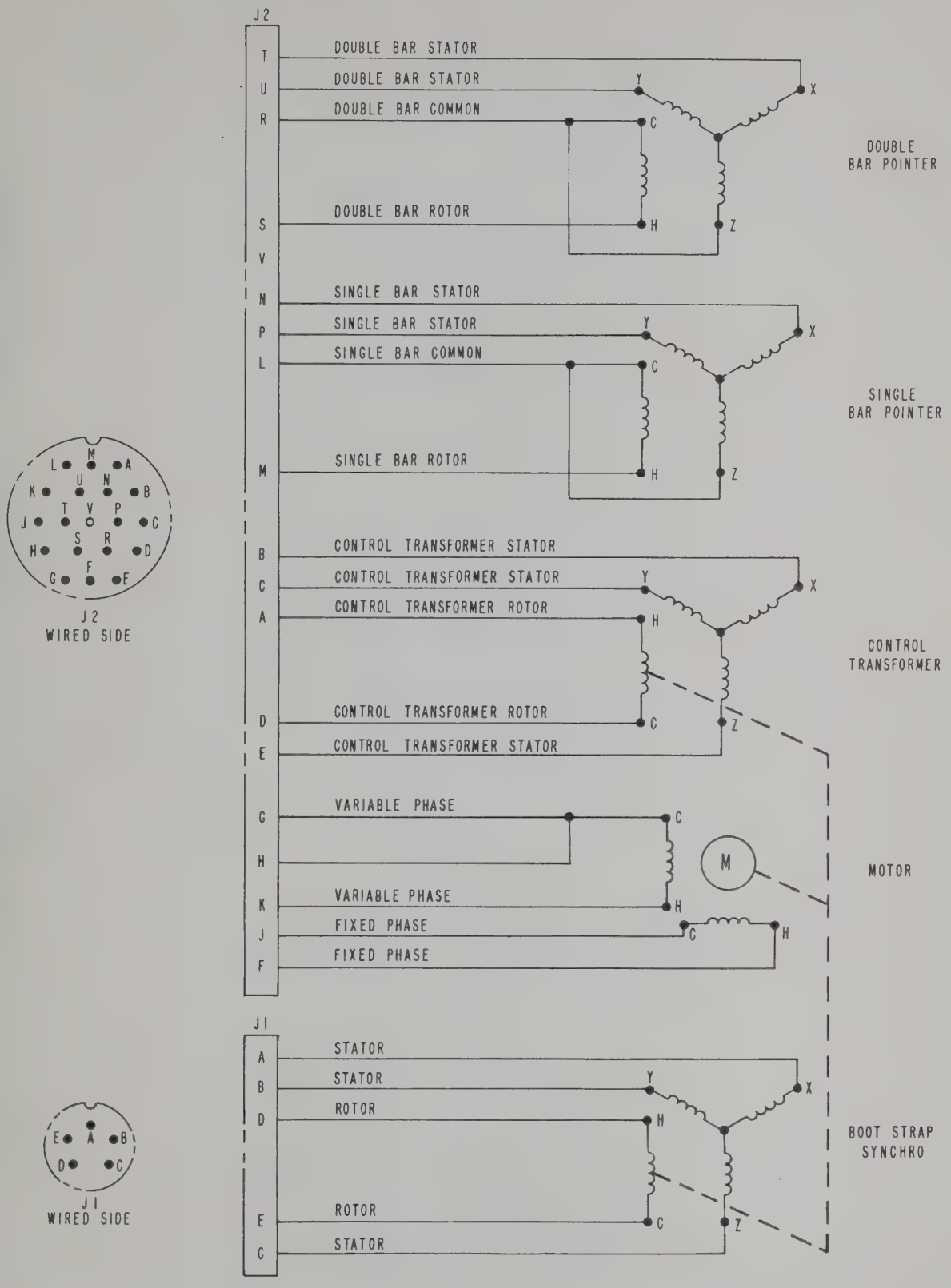


NOTES:

1. REFERENCE DESIGNATIONS ARE ABBREVIATED. FOR COMPLETE IDENTIFICATION, PREFIX THE PART DESIGNATION WITH THE ASSEMBLY DESIGNATION; FOR EXAMPLE, A6R1.
2. FOR SCHEMATIC DIAGRAM, SEE FIGURE 6-1.
3. WIRES CONNECTED TO P1 AND P2 ARE SUPPLIED WITH SERVOS AND MOTOR GENERATOR.
4. ROTOR LEADS MAY BE MARKED WITH A WHITE TRACER. IN THESE INSTANCES, THE COLORED SLEEVING IS NOT USED.

26996B(TP)

Figure 6–8. Gearing Assembly A6, Wiring Diagram



27226D(TP)

Figure 6–9. IN-16A Radio Magnetic Indicator, Schematic Diagram

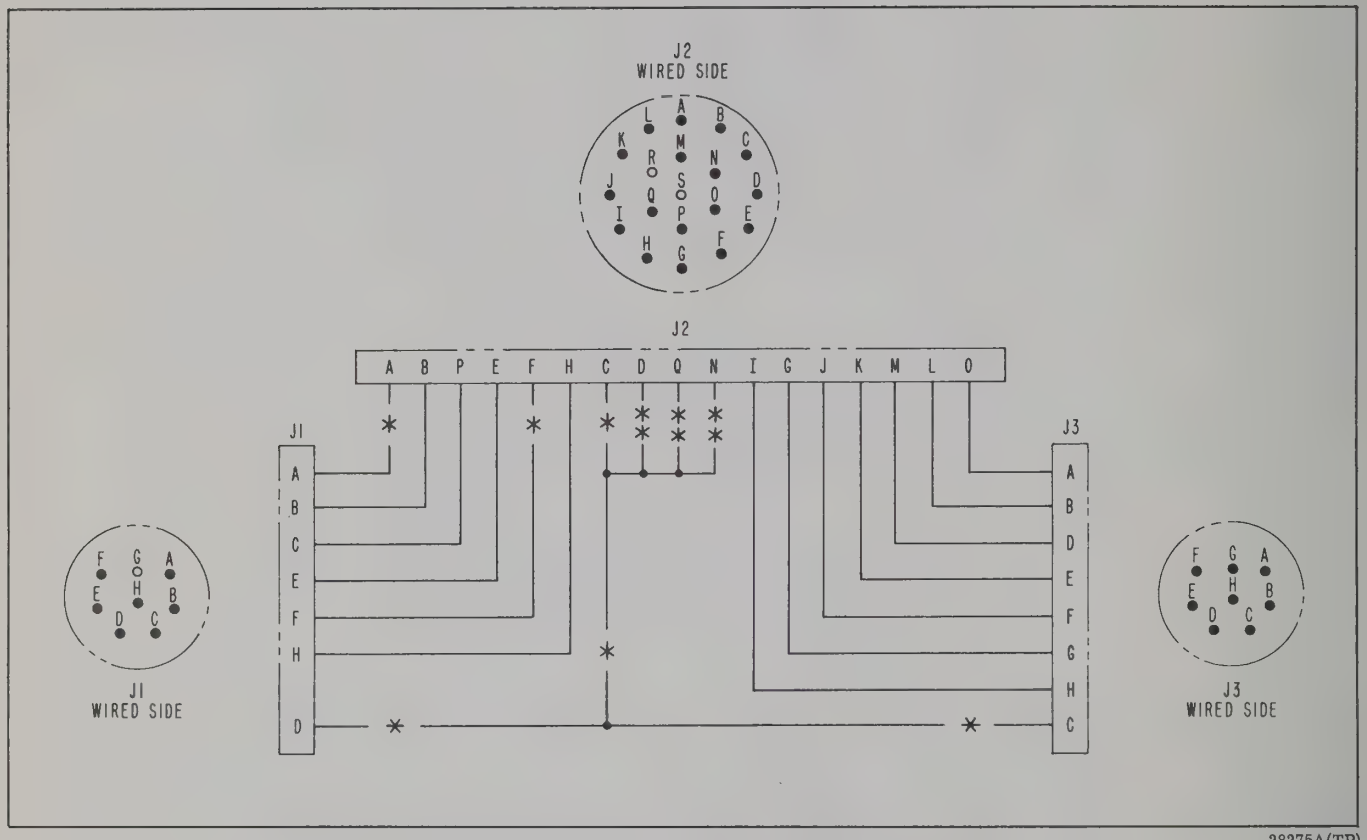


Figure 6–10. J-17A Junction Box, Schematic Diagram

SECTION VII

PARTS LIST

MANUFACTURERS' CODES

Code	Name and Address
AB	Allen-Bradley Co. Milwaukee, Wisconsin
AMP	Amphenol-Borg Electronics Corp. Broadview (Chicago), Illinois
CLIP	Clifton Precision Products Co. Clifton Heights, Pennsylvania
DABU	Dale Products, Inc. Columbus, Nebraska
FML	Fansteel Metallurgical Corp. North Chicago, Illinois
GAEM	Good-All Electric Mfg. Co. Ogallala, Nebraska
GE	General Electric Co. Schenectady, New York
HUG	Hughes Products Division Hughes Aircraft Co. Los Angeles, California
IEI	International Electronic Industries, Inc. Nashville, Tennessee
KER	Kearfott Co., Inc. Little Falls, New Jersey
SPR	Sprague Electric Co. North Adams, Massachusetts
TI	Texas Instruments, Inc. Semiconductor-Components Division Houston, Texas

Reference Designation[1]	Description	ARC Part No.	Manufacturer & Part No.
	A1, MODULATOR ASSEMBLY, ARC-25583		
C1	CAPACITOR, Fixed, electrolytic, 120 μf +75 -15 per cent, 3 vdcw	8973-0121	IEI TAE120-3SDGJ-P
C2	CAPACITOR, Fixed, electrolytic, 10 μf ±10 per cent, 3 vdcw	8974-0100	IEI TA10-3SDG1-NP1
C3	CAPACITOR, Fixed, same as C2		
C4	CAPACITOR, Fixed, same as C2		
C5	CAPACITOR, Fixed, electrolytic, 1000 μf +75 -15 per cent, 3 vdcw	8973-0102	IEI TAE1000-3SDML-P
C6	CAPACITOR, Fixed, electrolytic, 10 μf ±20 per cent, 20 vdcw	8914-0100	SPR 150D106X00020B2
CR1	SEMICONDUCTOR DEVICE, Diode	23037	HUG HD6226
CR2	SEMICONDUCTOR DEVICE, Diode, same as CR1		
CR3	SEMICONDUCTOR DEVICE, Diode, same as CR1		
CR4	SEMICONDUCTOR DEVICE, Diode, same as CR1		
K1	RELAY, Four pole	25884-0001	GE 3S2791FB100A9AR
L1	REACTOR	25276	
Q1	TRANSISTOR, Type 2N217	22293	
Q2	TRANSISTOR, Same as Q1		
R1	RESISTOR, Fixed, comp, 750 ohms ±5 per cent, 1/4w	341-0751	AB CB7515
R2	RESISTOR, Fixed, comp, 180 ohms ±5 per cent, 1/4w	341-0181	AB CB1815
R3	RESISTOR, Fixed, same as R1		
R4	RESISTOR, Fixed, comp, 6800 ohms ±10 per cent, 1/4w	200-0682	AB CB6821
R5	RESISTOR, Fixed, comp, 680 ohms ±10 per cent, 1/4w	200-0681	AB CB6811
R6	RESISTOR, Fixed, comp, 470 ohms ±10 per cent, 1/4w	200-0471	AB CB4711
R7	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4w	200-0102	AB CB1021
R8	RESISTOR, Variable, comp, 250 ohms ±20 per cent, 0.50w	8915-0251	AB GLU2512SD3028L
R9	RESISTOR, Fixed, same as R7		
R10	RESISTOR, Fixed, same as R6		
R11	RESISTOR, Variable, comp, 1000 ohms ±20 per cent, 0.50w	8915-0102	AB GLU1022SD3028L
R12	RESISTOR, Fixed, comp, 4700 ohms ±10 per cent, 1/4w	200-0472	AB CB4721
R13	RESISTOR, Fixed, same as R7		
R14	RESISTOR, Fixed, same as R7		
R15	RESISTOR, Fixed, comp, 100 ohms ±10 per cent, 1/4w	200-0101	AB CB1011
T1	TRANSFORMER, Power	25224	
	A2, SERVO AMPLIFIER ASSEMBLY, ARC-25590		
C1	CAPACITOR, Fixed, electrolytic, 10 μf ±20 per cent, 20 vdcw	8914-0100	SPR 150D106X0020B2
C2	CAPACITOR, Fixed, electrolytic, 40 μf ±20 per cent, 10 vdcw	8919-0400	SPR 150D406X0010B2
C3	CAPACITOR, Fixed, electrolytic, 60 μf ±20 per cent, 6 vdcw	8918-0600	SPR 150D606X0006B2
C4	CAPACITOR, Fixed, same as C3		

[1] Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation[1]	Description	ARC Part No.	Manufacturer & Part No.
	A2, SERVO AMPLIFIER ASSEMBLY, ARC-25590 - Continued		
C5	CAPACITOR, Fixed, paper, 0.22 μf ±20 per cent, 200 vdcw	8913-9222	SPR 118P22402S4
C6	CAPACITOR, Fixed, electrolytic, 22 μf ±20 per cent, 15 vdcw	8920-0220	SPR 150D226X0015B2
C7	CAPACITOR, Fixed, electrolytic, 47 μf ±20 per cent, 50 vdcw	8924-0470	SPR 109D476X0050F2
C8	CAPACITOR, Fixed, paper, 0.1 μf ±20 per cent, 100 vdcw	8889-9102	SPR 196P10401S4
C9	CAPACITOR, Fixed, same as C3		
C10	CAPACITOR, Fixed, same as C3		
C11	CAPACITOR, Fixed, electrolytic, 3 μf ±20 per cent, 100 vdcw	25436	SPR 110D305X0100G1
CR1	SEMICONDUCTOR DEVICE, Diode	23037	HUG HD6226
CR2	SEMICONDUCTOR DEVICE, Diode, same as CR1		
Q1	TRANSISTOR, Type 2N647	22442	
Q2	TRANSISTOR, Same as Q1		
Q3	TRANSISTOR, Type 2N270	22635	
Q4	TRANSISTOR, Type 2N1172	25383	
Q5	TRANSISTOR, Same as Q4		
Q6	TRANSISTOR, Type 2N1149	25585	
Q7	TRANSISTOR, Same as Q6		
R1	RESISTOR, Fixed, comp, 47 ohms ±10 per cent, 1/4w	200-0470	AB CB4701
R2	RESISTOR, Fixed, comp, 2200 ohms ±10 per cent, 1/4w	200-0222	AB CB2221
R3	RESISTOR, Variable, comp, 10,000 ohms ±20 per cent, 0.50w	8915-0103	AB GLU1032SD3028L
R4	RESISTOR, Fixed, same as R2		
R5	RESISTOR, Fixed, comp, 1500 ohms ±10 per cent, 1/4w	200-0152	AB CB1521
R6	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4w	200-0102	AB CB1021
R7	RESISTOR, Fixed, same as R6		
R8	RESISTOR, Fixed, same as R2		
R9	RESISTOR, Fixed, comp, 2700 ohms ±10 per cent, 1/4w	200-0272	AB CB2721
R10	RESISTOR, Fixed, same as R2		
R11	RESISTOR, Fixed, same as R6		
R12	RESISTOR, Fixed, comp, 1200 ohms ±10 per cent, 1/4w	200-0122	AB CB1221
R13	RESISTOR, Fixed, ww, 12 ohms ±3 per cent, 3w	209-0120	DABU RS2-120H
R14	RESISTOR, Fixed, same as R13		
R15	RESISTOR, Variable, comp, 25,000 ohms ±20 per cent, 1/4w	8965-0253	AB Type R
R16	RESISTOR, Fixed, comp, 15,000 ohms ±10 per cent, 1/4w	200-0153	AB CB1531
R17	RESISTOR, Fixed, same as R1		
T1	TRANSFORMER, Driver	24922	
	A3, HEADING SERVO AMPLIFIER ASSEMBLY, ARC-27145		
C1	CAPACITOR, Fixed, electrolytic, 10 μf ±20 per cent, 20 vdcw	8914-0100	SPR 150D106X0020B2
C2	CAPACITOR, Fixed, electrolytic, 47 μf ±20 per cent, 50 vdcw	8924-0470	SPR 109D476X0050F2

[1] Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation[1]	Description	ARC Part No.	Manufacturer & Part No.
	A3, HEADING SERVO AMPLIFIER ASSEMBLY, ARC-27145 - Continued		
C3	CAPACITOR, Fixed, paper, 0.22 μf ±20 per cent, 200 vdcw	8913-9222	SPR 118P22402S4
C4	CAPACITOR, Fixed, electrolytic, 22 μf ±20 per cent, 15 vdcw	8920-0220	SPR 150D226X0015B2
C5	CAPACITOR, Fixed, paper, 0.1 μf ±20 per cent, 100 vdcw	8889-9102	SPR 196P10401S4
C6	CAPACITOR, Fixed, electrolytic, 2 μf ±20 per cent, 150 vdcw	8851	SPR 110D205X0150G1
C7	CAPACITOR, Fixed, plastic, 0.047 μf ±5 per cent, 200 vdcw	8747	CLD TWMA2S47-1
C8	CAPACITOR, Fixed, plastic, 0.22 μf ±20 per cent, 50 vdcw	8996-9222	GAEM 601PE
CR1	SEMICONDUCTOR DEVICE, Diode	23037	HUG HD6226
CR2	SEMICONDUCTOR DEVICE, Diode, same as CR1		
Q1	TRANSISTOR, Type 2N217	22293	
Q2	TRANSISTOR, Type 2N270	22635	
Q3	TRANSISTOR, Type 2N1172	25383	
Q4	TRANSISTOR, Same as Q3		
R1	RESISTOR, Fixed, comp, 6800 ohms ±5 per cent, 1/2w	201-0682	AB EB6825
R2	RESISTOR, Fixed, comp, 5600 ohms ±5 per cent, 1/2w	201-0562	AB EB5625
R3	RESISTOR, Variable, comp, 10,000 ohms ±20 per cent, 1/2w	8915-0103	AB GLU1032SD3028L
R4	RESISTOR, Fixed, comp, 4700 ohms ±5 per cent, 1/2w	201-0472	AB EB4725
R5	RESISTOR, Fixed, comp, 2700 ohms ±5 per cent, 1/2w	201-0272	AB EB2725
R6	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/2w	201-0102	AB EB1025
R7	RESISTOR, Fixed, comp, 1800 ohms ±5 per cent, 1/2w	201-0182	AB EB1825
R8	RESISTOR, Fixed, ww, 12 ohms ±3 per cent, 3w	209-0120	DABU RS2-120H
R9	RESISTOR, Fixed, same as R8		
R10	RESISTOR, Fixed, comp, 10 ohms ±5 per cent, 1/2w	201-0100	AB EB1005
R11	RESISTOR, Fixed, comp, 10,000 ohms ±5 per cent, 1/2w	201-0103	AB EB1035
R12	RESISTOR, Fixed, same as R6		
R13	RESISTOR, Fixed, comp, 100,000 ohms ±5 per cent, 1/2w	201-0104	AB EB1045
T1	TRANSFORMER, Driver	24922	
	A4, HEADING FREQUENCY CONVERTER ASSEMBLY, ARC-27146		
C1	CAPACITOR, Fixed, electrolytic, 3 μf ±20 per cent, 100 vdcw	25436	SPR 110D305X0100G1
CR1	SEMICONDUCTOR DEVICE, Diode	23037	HUG HD6226
CR2	SEMICONDUCTOR DEVICE, Diode, same as CR1		
Q1	TRANSISTOR, Type 2N217	22293	
Q2	TRANSISTOR, Same as Q1		

[1] Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designations[1]	Description	ARC Part No.	Manufacturer & Part No.
	A4, HEADING FREQUENCY CONVERTER ASSEMBLY, ARC-27146 - Continued		
R1	RESISTOR, Fixed, comp, 1000 ohms ±10 per cent, 1/4w	200-0102	AB CB1021
R2	RESISTOR, Fixed, same as R1		
R3	RESISTOR, Fixed, same as R1		
R4	RESISTOR, Fixed, same as R1		
T1	TRANSFORMER, Step down	26445	
T2	TRANSFORMER, Step down, same as T1		
	A5, INVERTER ASSEMBLY, ARC-27147		
C1	CAPACITOR, Fixed, electrolytic, 10 μf ±20 per cent, 20 vdcw	8914-0100	SPR 150D106X0020B2
C2	CAPACITOR, Fixed, plastic, 0.047 μf ±10 per cent, 400 vdcw	27039-9473	GAEM X663FR47394W
C3	CAPACITOR, Fixed, electrolytic, 60 μf -15 +75 per cent, 50 vdcw	23943	FML F310
C4	CAPACITOR, Fixed, plastic, 0.68 μf ±5 per cent, 600 vdcw	27038-9682	GAEM X663FR68456W
CR1	SEMICONDUCTOR DEVICE, Diode, type 1N2825A	26722-0360	
Q1	TRANSISTOR, Type 2N1183B	8984-0003	
R1	RESISTOR, Fixed, comp, 1500 ohms ±5 per cent, 1w	202-0152	AB GB1525
R2	RESISTOR, Fixed, comp, 22 ohms ±5 per cent, 1/2w	201-0220	AB EB2205
R3	RESISTOR, Fixed, same as R2		
R4	RESISTOR, Fixed, comp, 68 ohms ±5 per cent, 1w	202-0680	AB GB6805
R5	RESISTOR, Fixed, ww, 1.4 ohms ±3 per cent, 3w	209-9141	DABU RS2-1R4H
R6	RESISTOR, Fixed, ww, 1 ohm ±5 per cent, 5w	27817-9101	SPR 243E1R05
T1	TRANSFORMER	25943	
T2	TRANSFORMER	27000	
	A6, GEARING ASSEMBLY, ARC-26996		
B1	SYNCHRO, Differential	25438	KER RS941-1A
B2	SYNCHRO, Phase shifter	25479	CLIP PSC-15-A-2
B3	SYNCHRO, Resolver	25437	KER RS931-3A
MG1	MOTOR GENERATOR	26995	CLIP ACGC-10-J-10
P1	CONNECTOR, Plug, electrical	25418	
P2	CONNECTOR, Plug, electrical	25416	
R1	RESISTOR, Fixed, comp, 1500 ohms ±10 per cent, 1/4w	200-0152	AB CB1521
R2	RESISTOR, Fixed, comp, 330 ohms ±10 per cent, 1/4w	200-0331	AB CB3311
RT1	RESISTOR, Thermal, 470 ohms ±10 per cent, 1/8w	8944-0471	TI TM1/8-471K
TB1	PANEL ASSEMBLY (for mechanical breakdown, see Figure 5-2)	25421	

[1] Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.

Reference Designation[1]	Description	ARC Part No.	Manufacturer & Part No.
	A7, CONVERTER CHASSIS ASSEMBLY, ARC-25930		
A1	MODULATOR ASSEMBLY	25583	
A2	SERVO AMPLIFIER ASSEMBLY	25590	
A3	RMI SERVO AMPLIFIER ASSEMBLY	27145	
A4	HEADING FREQUENCY CONVERTER ASSEMBLY	27146	
A5	INVERTER ASSEMBLY	27147	
A6	GEARING UNIT ASSEMBLY	26996	
C1	CAPACITOR, Fixed, electrolytic, 3500 μf +75 -15 per cent, 3 vdcw	8973-0352	IEI TAE3500-3SDNT-P
J1	CONNECTOR, Receptacle, electrical	22629	AMP 94-65940-2
K1	RELAY, Armature	25225-0006	GE 3S2791G210F10
K2	RELAY, Armature	26138-0001	GE 3S2791G200F9AR
Q1	TRANSISTOR, Type 2N174	26119	
Q2	TRANSISTOR, Same as Q1		
R1	RESISTOR, Fixed, comp, 1000 ohms ±5 per cent, 1/4w	341-0102	AB CB1025
R2	RESISTOR, Fixed, comp, 510 ohms ±5 per cent, 1/4w	341-0511	AB CB5115
TB1	PANEL ASSEMBLY	25421	
TB2	PRINTED CIRCUIT ASSEMBLY, p/o 26992	27017	

[1] Reference designations are abbreviated; for complete identification, prefix with applicable assembly designation.